the OIL AND GAS JOURNAL

We often speak of Timken bearings as the "hidden product" because, once installed in a machine, they can't be seen; in fact, in many cases, they are never seen—and seldom thought of—during the entire life of the equipment. It's "out of sight out of mind."

They make their presence felt in many ways, however. In smooth, frictionless machine operation; in absence of wear; in constant protection against radial, thrust and combined loads; in freedom from the need of frequent lubrication or other maintenance attention; in dependable operation through years of faithful service.

Timken tapered roller bearings have had a prominent part in many oil well drilling records. You need them today more than ever before. Make sure you have them in any new drilling and pumping equipment you buy. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address "TIMROSCO".

TIMKEN
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▱ BEARING TAKES RADIAL ⊙ AND THRUST →⊙← LOADS OR ANY COMBINATION →⊙←

PRICE 50 CENTS

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SERVICE

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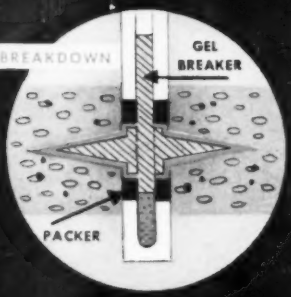
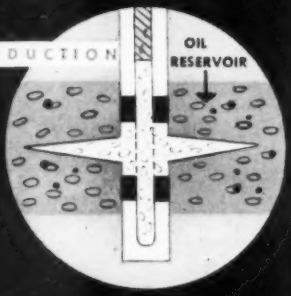


3
PRODUCTION



A new **HOWCO** *service*

Actual results definitely establish the Hydrafrac* Process as a factor of *major importance* in stepping up the production of old and new wells. By the use of hydraulic pressure and specially developed fluids and methods, Hydrafrac Service creates a permanent increase in permeability—with production increases which, in the first group of wells treated, ranged from *28 to 108 per cent.* Ask the nearest Howco representative for facts and performance data.

*Hydrafrac is a service mark of Stanolind Oil & Gas Company.

HALLIBURTON OIL WELL CEMENTING CO.

DUNCAN, OKLAHOMA

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(Slide rule, calculus, counting on your fingers)...

Bethlehem Wire Rope Means Low Cost per Unit of Work

Actually, it's as simple as 2 + 2 = 4. All you do is divide the purchase price of the rope by the total units of work it does in its life. The answer, of course, is cost per unit of work—the only *real* measure of wire rope economy.

What is a unit of work? It can be a ton of rock moved by a power shovel. Or a car of coal hauled up a slope. Or a ton-mile in oil-country rotary drilling. These are but three examples; there are many others. It isn't difficult to record, or closely estimate, the amount of work that a wire rope accounts for. That total will be high—and the unit cost *low*—when your choice is a Bethlehem rope.

It isn't first cost that determines whether a wire rope is expensive or economical. The rope labeled "Bargain" is frequently quite the reverse. You've found a bargain only when the rope cost is low with respect to the useful work accomplished.

On this basis—the only true yardstick—Bethlehem rope is a genuine "buy." Every foot, every inch of it, is built for service. . . built to give you *low* cost per unit of work. You can order it with confidence.

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BETHLEHEM, PA.

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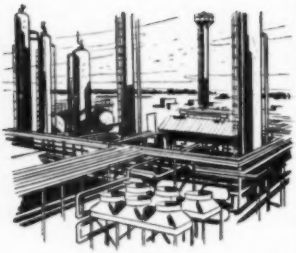
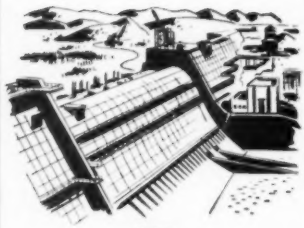
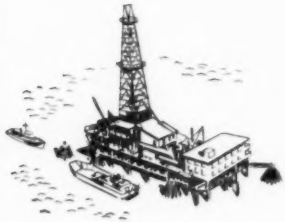


GASOLINE PLANTS



DAMS



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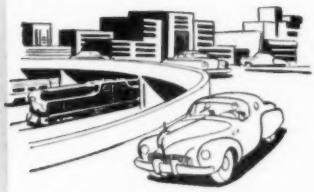

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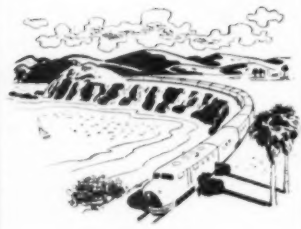

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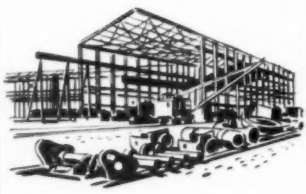

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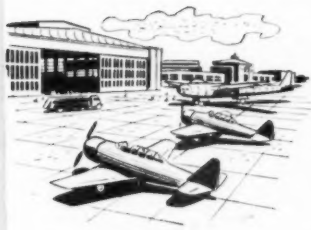

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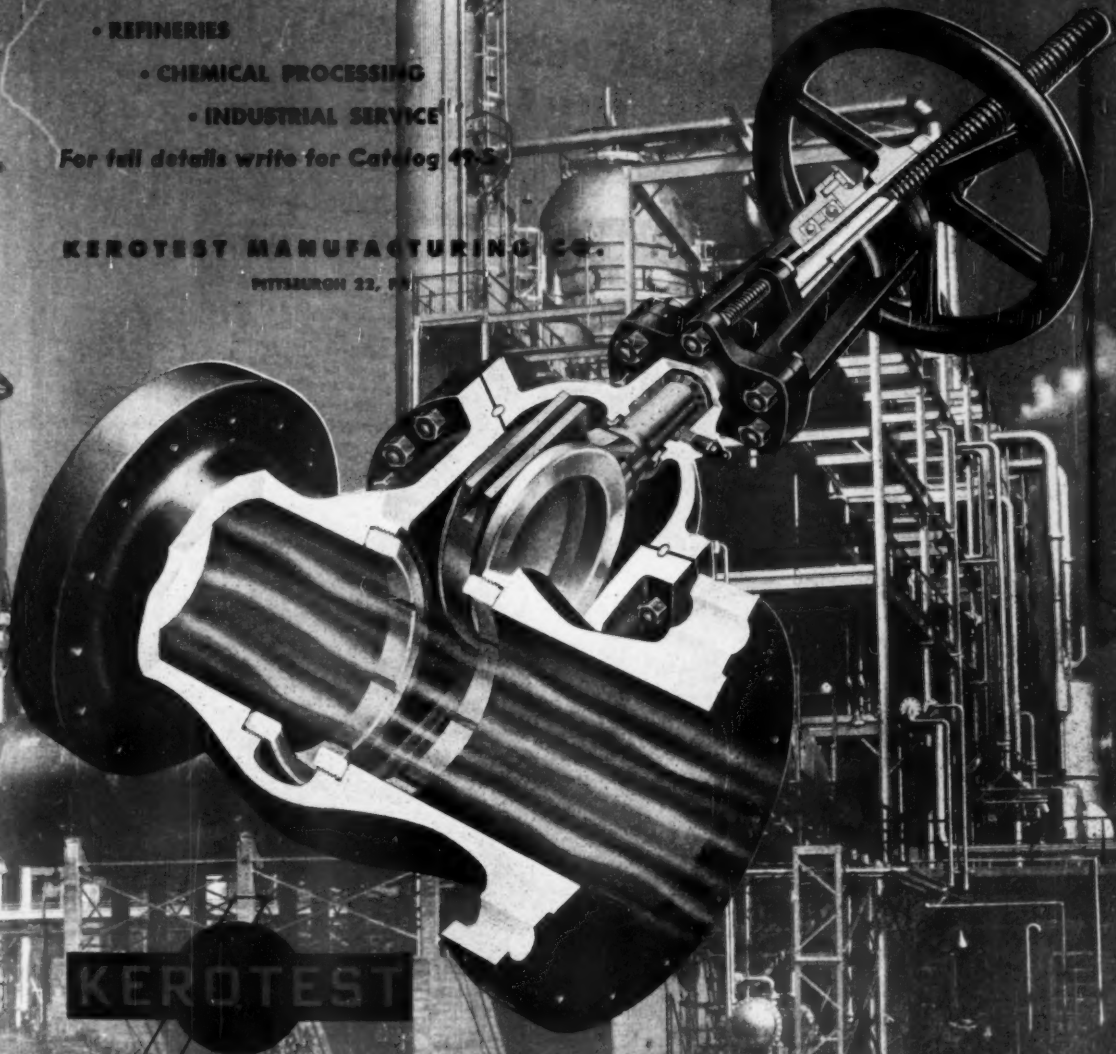

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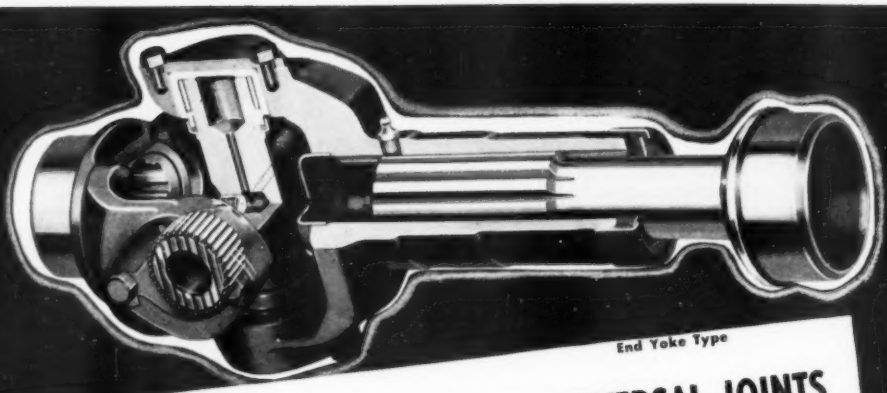

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Spicer engineers will help adapt Spicer Needle Bearing Joints to your particular needs.

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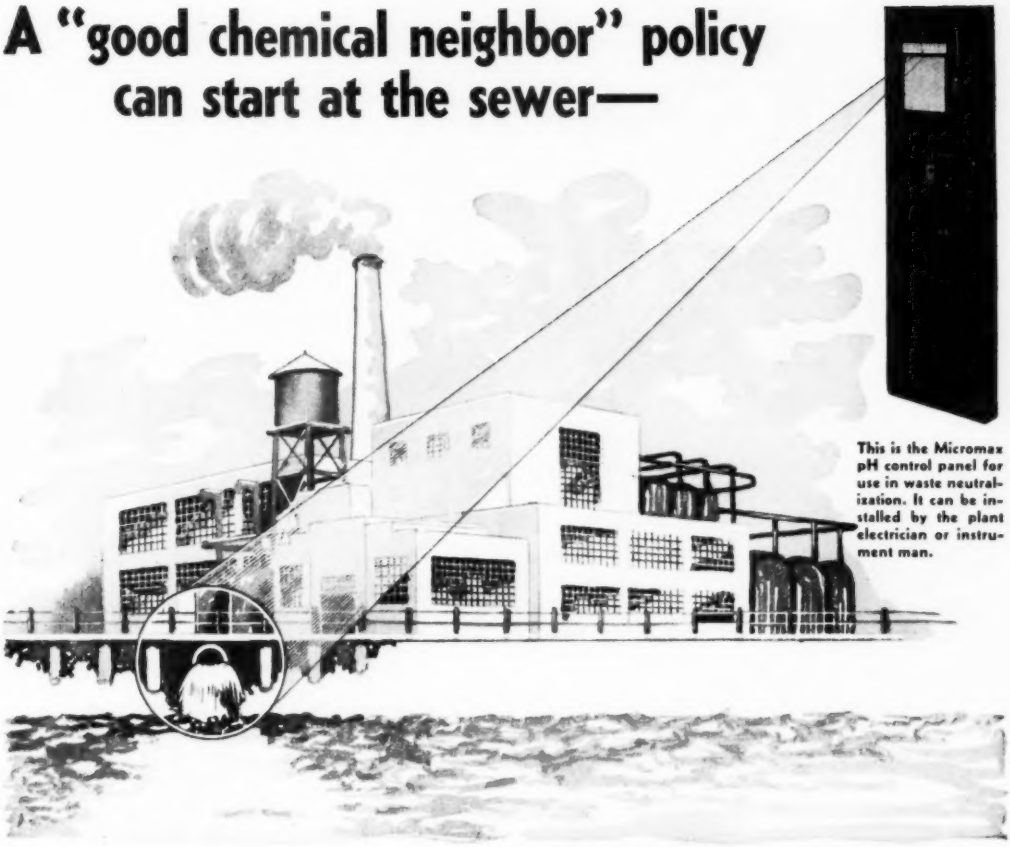
A "good chemical neighbor" policy can start at the sewer—



This is the Micromax pH control panel for use in waste neutralization. It can be installed by the plant electrician or instrument man.

THE sewer outfall marks the spot where a plant can prevent stream pollution by discharging only wastes which have been properly treated. And, when proper treatment is linked to pH control, we can probably help . . . effectively. We can assist engineers to set up good "chemical relations" between a company and the rest of the community . . . make the plant a good chemical neighbor.

Our contribution is through Micromax automatic pH control. Correct pH is often the definite assurance that plant wastes are meeting the requirements of good stream chemistry. We can tell you in just a few minutes whether pH on your waste neutralization system—either a present system or a contemplated one—can be controlled automatically; whether you can hold pH within prescribed limits.

Controllability analysis predicts actual results. Through long experience with pH control applications, we have developed a unique system of "controllability analysis". By scientifically weighing all pH control factors—type of waste, treating system, reagent—this analysis determines the net control effect possible for a given treating system.

If you're planning pH control, you can't afford to miss this special service. Our catalog "Effective Neutralization of Industrial Wastes" explains controllability analysis in full detail. For your convenience, it also contains a simple questionnaire . . . so we can help you begin solving your plant's pH problems now. You can answer the questions in just a few minutes.

Ask for Bulletin ND44-96-708. Address Leeds & Northrup Company, 4959 Stenton Ave., Philadelphia 44, Pa.

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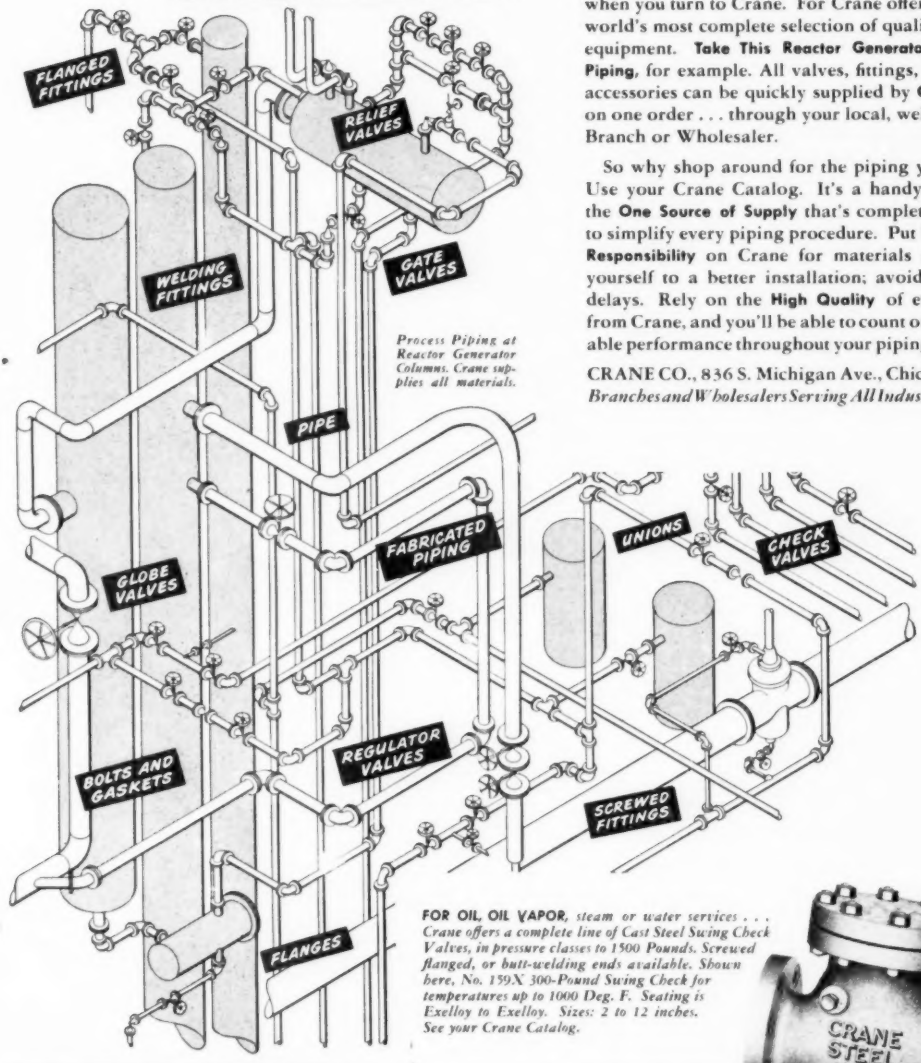

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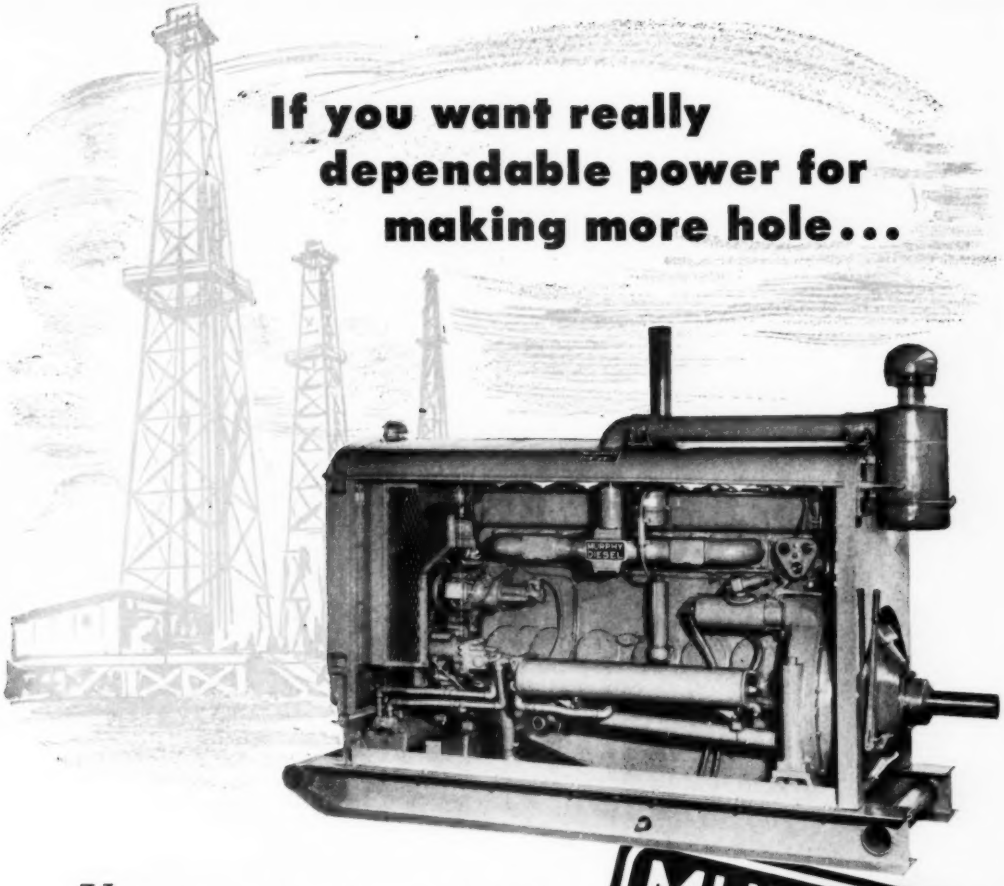
If you want really dependable power for making more hole...



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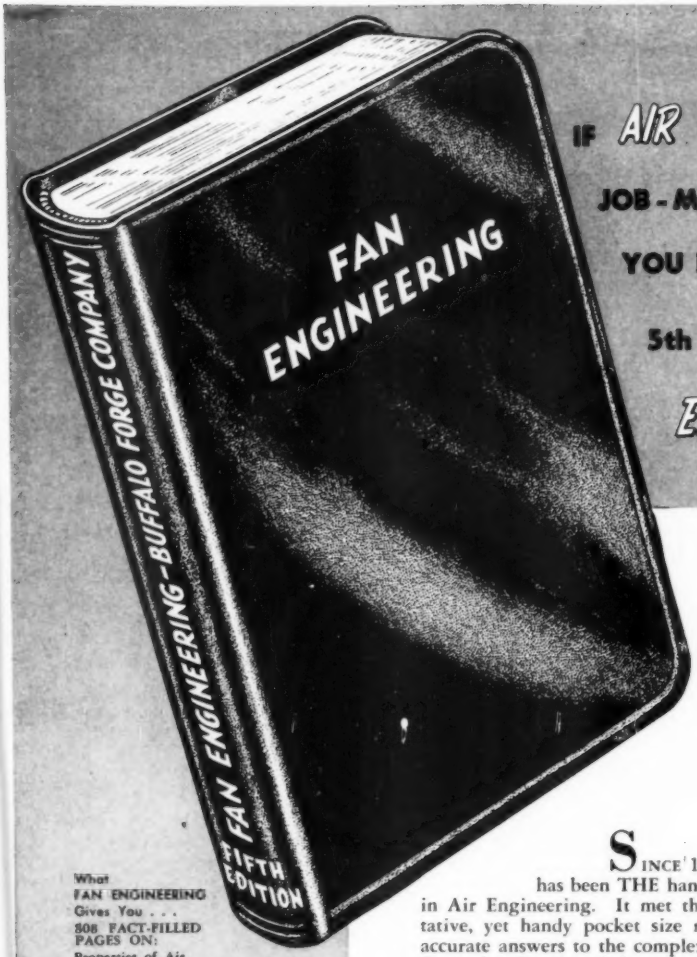

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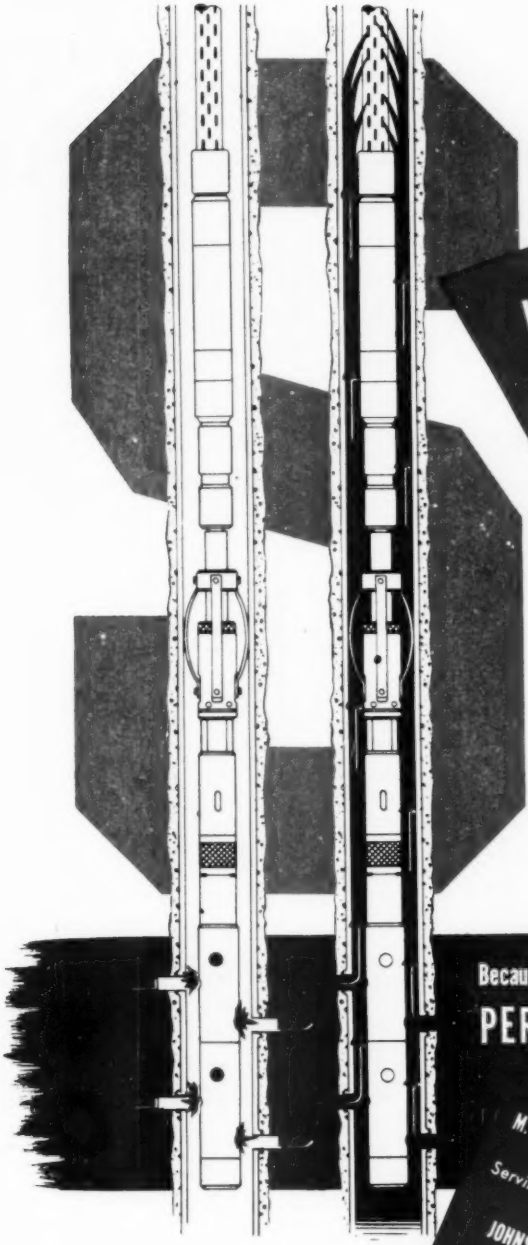

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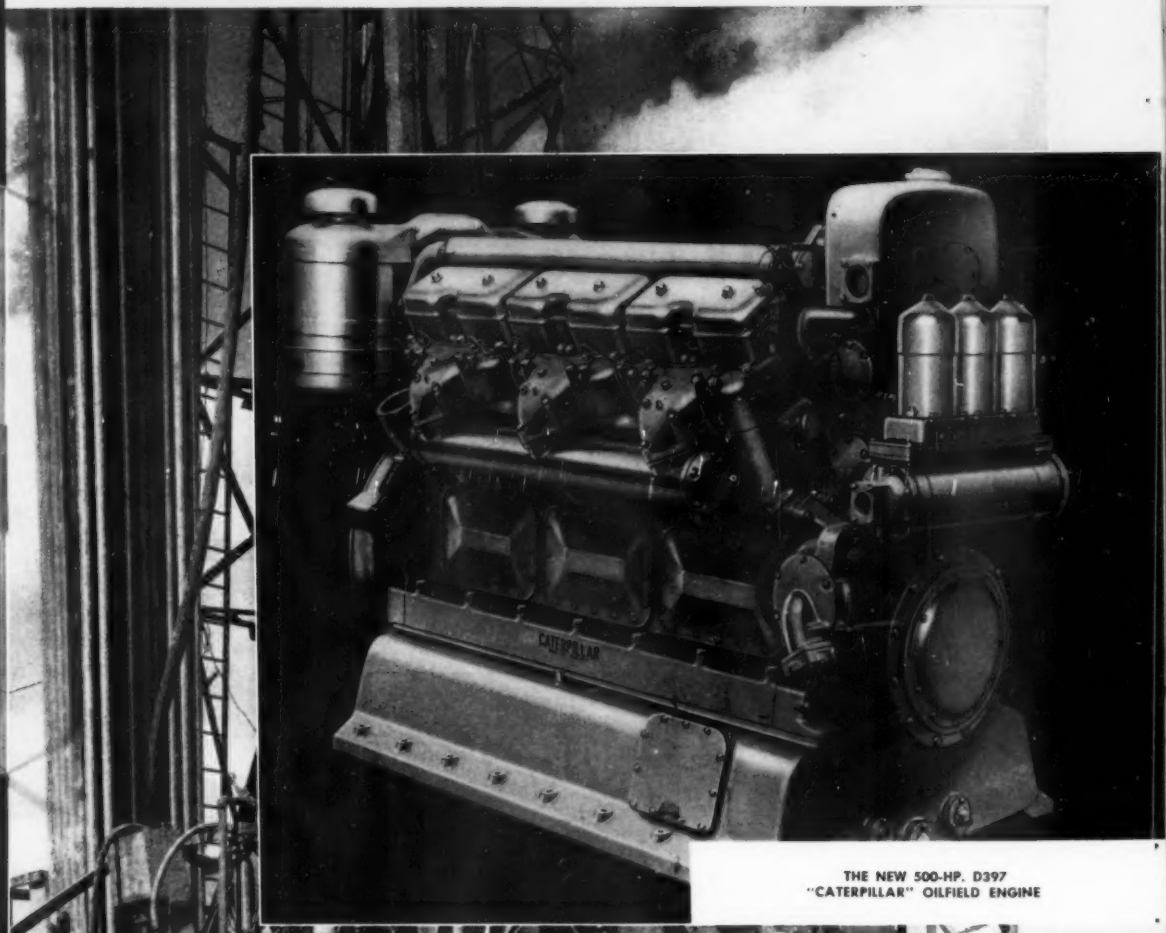

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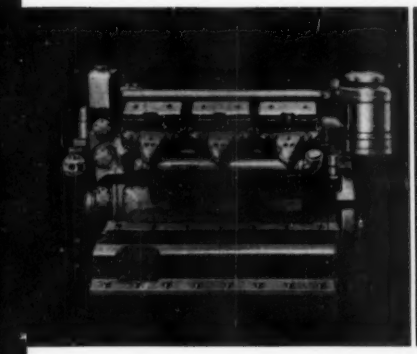

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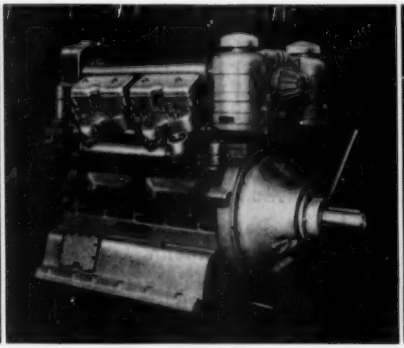

THE NEW 335-HP. D375
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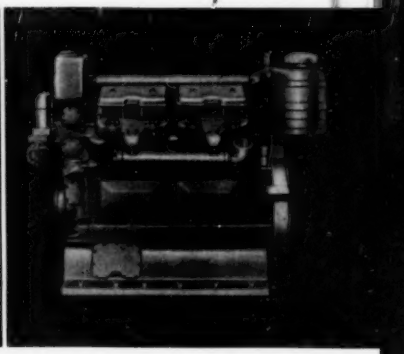

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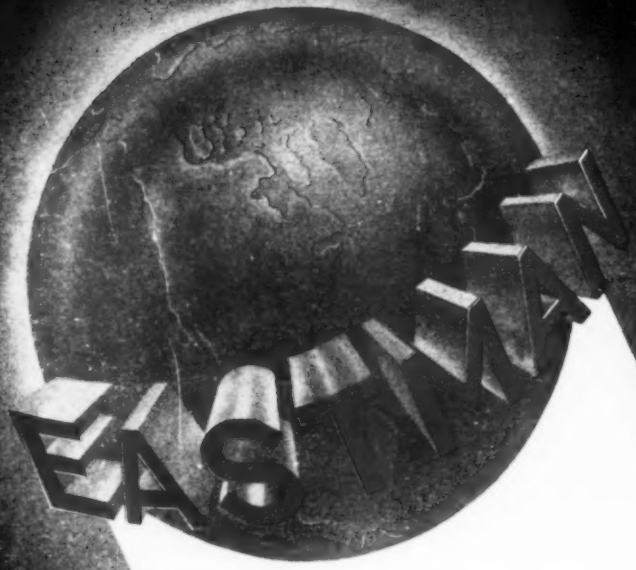

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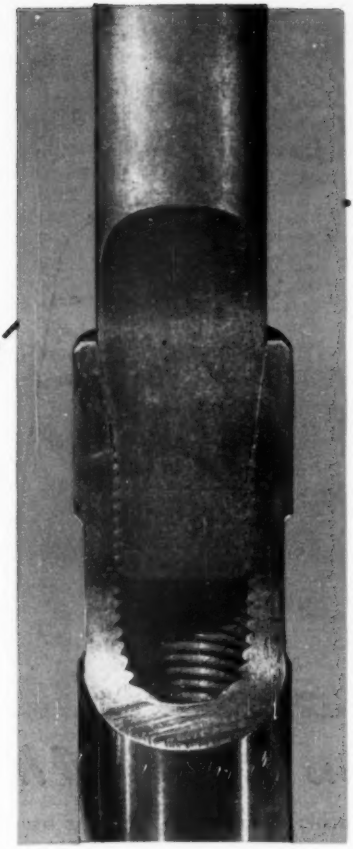

NO PIN FAILURES

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Its design prevents high surface stresses leading to fatigue failures. Available in all API lengths and sizes.

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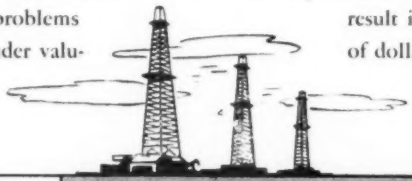
Baroid

MUD CONTROL *Before* SPUDDING IN

Several well-known operators follow a policy of consulting Baroid field service engineers on drilling problems in a given area, *before* drilling starts. They profit by these pre-drilling consultations through reduction in drilling costs and by earlier and better completions.

They find that Baroid engineers, through their long experience and intimate knowledge of the drilling problems of each district, can render valuable advice in prescribing an over-all mud program to avoid trouble and to save money.

Baroid engineers have long been noted for their ability to serve when trouble occurs. They also render even more valuable service by preventing trouble before it starts. Consultation with the Baroid engineer in your district before you drill may result in saving you thousands of dollars when you drill.



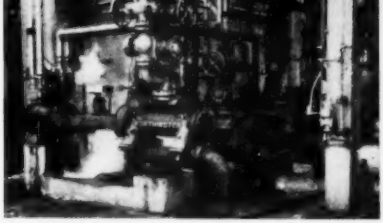
PATENT LICENSES unrestricted as to sources of supply of materials, but on royalty bases, will be granted to responsible oil companies and others desiring to practice the subject matter of any and/or all of United States Patent Numbers 2,041,086; 2,044,758; 2,064,936; 2,094,316; 2,119,829; 2,294,877; 2,387,694; 2,393,165; 2,393,173; 2,417,307 and further improvements thereof. Application for licenses should be made to Los Angeles office.

BAROID SALES DIVISION

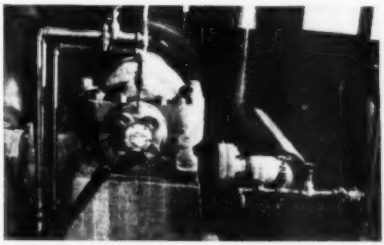
NATIONAL LEAD COMPANY

LOS ANGELES 12 • TULSA 3 • HOUSTON 2

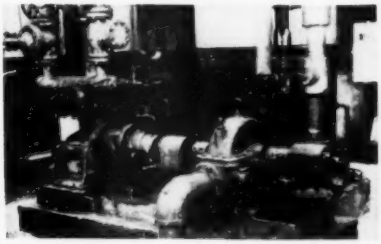
Worthington deaerating feed water heater



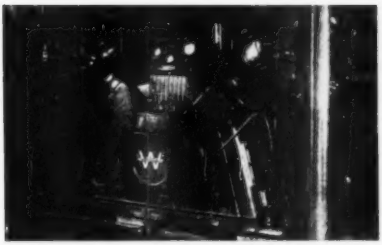
Worthington HiVol reciprocating pumps



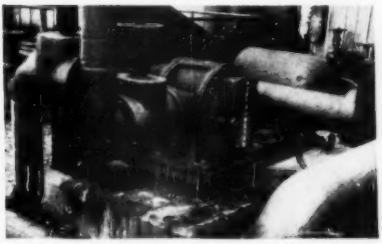
Worthington feed water pump



Worthington-Moore turbine-driven pump



Worthington air compressor



Worthington rotary asphalt pumps

Most Everything Here Is Moved By Worthington

Worthington equipment plays an important part in handling water, air, crude oil and refined products at the refinery of a large independent in the Chicago area.

Water for cooling purposes is pumped, in tremendous quantities, from a large canal to the refinery by a Worthington circulating pump, a Type 16-LA-2, driven by a 250 hp motor. It supplies 7000 gpm against a 120 ft head, and has been doing this for more than 10 years, 24 hours a day, without shutdown except for normal maintenance.

In the boiler room, feed water is preheated to almost 250 deg. before entering the boiler by a Worthington deaerating feed water heater. The present heater of the steam jet type was purchased a year ago to remove oxygen from the water in order to lower corrosion in the boiler tubes. It is rated at 225,000 pounds per hour, and replaced a Worthington Type N6 which had been used for 15 years and was still in perfect condition but not of large enough capacity to meet the new conditions.

At the same time, a new boiler feed pump was installed to take care of the added capacity. It is driven by a 125 hp motor and furnishes 500 gpm against a 600 ft head.

Compressed air to operate power tools and instruments is furnished by two Worthington Air Compressors purchased 15 years ago, and a new Type YC2 with 798 cfm capacity was added to the group in 1945 and has been been running continually since then.

To drive oil through the stills, a centrifugal hot oil charge pump is used. It is driven at 3600 rpm by a Worthington 450 hp condensing steam turbine and is serviced by a Worthington barometric condenser.

This unit replaced an old Worthington reciprocating plunger type pump which had been purchased in 1931. The old plunger type was over 40 feet long, compared with 10 feet for the turbine type.

Cracked gasoline is pumped to the stabilizer by a Worthington-Moore turbine-driven pump, 1300 lb on suction side, 325 lb on discharge. This pump is unique in that it has a mechanical seal which has eliminated packing scoring with its subsequent leaking, and consequently it requires much less maintenance and runs longer without shut downs.

Three Worthington HiVol reciprocating steam pumps are used in the production of propane. The 18x8½x18 pumps the impure LPG into the depropanizor tower; the 12x8x18 reflux pump is part of the control of the process on the tower; the 10x6x12 is used for standby duty.

Two Worthington type 6-GR rotary asphalt pumps, driven by 40 hp motors, circulate the asphalt from the storage tanks through a heater and back to the tank to prevent the asphalt from solidifying. They are also used to pump the asphalt into tank cars and tank trucks.

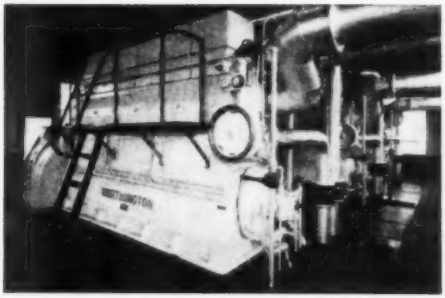
NEWS

FROM THE PETROLEUM FRONT

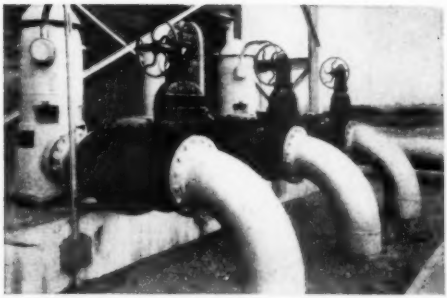
AS REPORTED BY THE DEVELOPMENT ENGINEERS, FIELD SERVICE REPRESENTATIVES AND CUSTOMERS OF WORTHINGTON

1

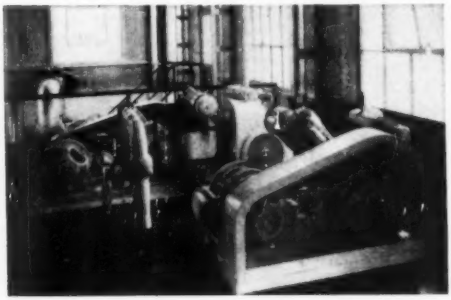
NEWS from the petroleum front



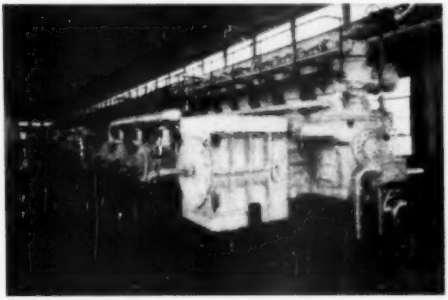
Three Worthington auxiliary engines in gas compressor station at Tennessee Gas Transmission Co., East Bernard, Texas



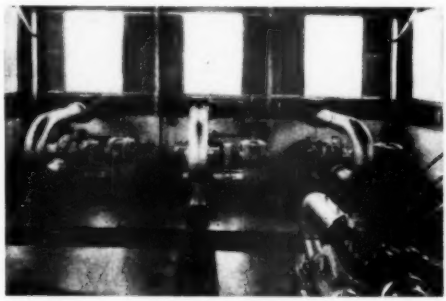
Worthington vertical turbine pump circulating water over cooling tower in main line gas compressor station at Tennessee Gas Transmission Co., East Bernard, Texas



Worthington Air Compressors for starting engines in main line booster station, Tennessee Gas, East Bernard, Texas



Eleven Worthington compressor engines in main line compressor station, Tennessee Gas Transmission Co., East Bernard, Texas



Worthington 10" water pumps handling jacket water to auxiliary engines, Tennessee Gas Transmission Co., East Bernard, Texas

Five Jobs For Worthington At Tennessee Gas Transmission Company

The East Bernard, Texas plant of the Tennessee Gas Transmission Company is now using Worthington vertical turbine pumps, gas compressors, gas engines, starting air compressor units and centrifugal pumps to handle natural gas in the pipe lines from South Texas to West Virginia.

All this equipment was installed in 1944, and has been operating satisfactorily since that time. Three vertical turbine pumps circulate the cooling tower water over the cooling tower in the gas pipe line compressor station. Similar pumps are used at station No. 4 at Jasper, Tex., station No. 6 at Monroe, La., and station No. 7 at Greenville, Miss.

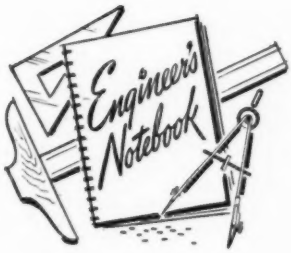
Eleven compressor engines in the main line station, the second compressor station on this gas pipe line, handle approximately 360,000,000 cubic feet of natural gas per day.

Three CCF-6 Worthington gas engines drive Westinghouse generators for supplying electric power for gas pipe line compressor station.

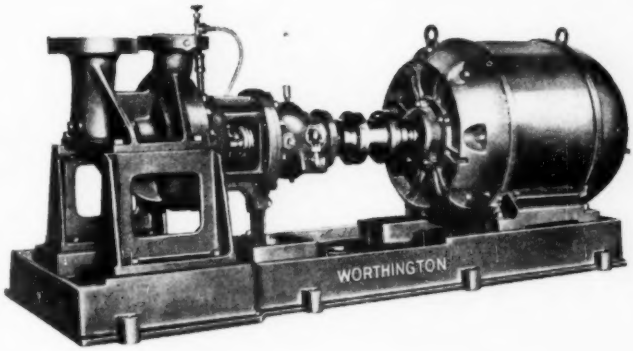
Three 12LA-1 60 hp centrifugal pumps and two 6L-1 25 hp centrifugal pumps supply jacket water for cooling gas engine driven pipe line compressors. Similar pumps are also installed at stations No. 4 at Jasper, No. 6 at Monroe and No. 7 at Greenville.

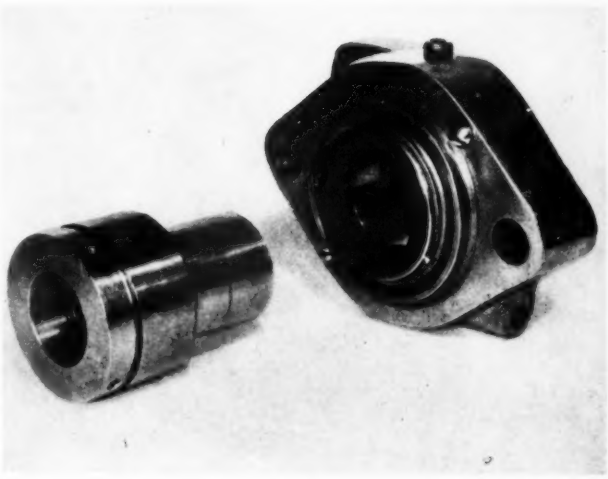
Worthington Pump and Machinery Corporation
Harrison, N. J.

NEWS



Mechanical Seals for Centrifugal Refinery Pumps





Because satisfactory stuffing box operation is necessary for a successful pump operation, Worthington has spent several years investigating the problems presented by high pressures and non-lubricating liquids now common in the petroleum refining and petrochemical industries.

The result of this investigation is the development of a single mechanical seal to be used in the stuffing box of process pumps handling light hydrocarbons at high pressures.

The first objective in Worthington's development work was to eliminate the costly seal oil system and the frequent replacement of conventional packing. At the same time, it was decided to keep the mechanical seal as simple as possible so that it could be installed, operated and maintained by normal refinery personnel at a minimum of cost.

This has been accomplished by making the rotating element a simple, streamlined assembly—as shown in the picture.

It is streamlined to eliminate churning in the liquid and has been symmetrically designed so that vibration at any speed is eliminated. The stationary element provides the necessary flexibility for a seal of this type and is an assembled unit that requires no adjustment on the pump, or during the assembly of the pump and seal. The materials used for the rotating and stationary seal faces are such that friction is reduced to a minimum and by incorporating hydraulic balance, long life is assured.

Single mechanical seals eliminate the possibility of contamination of product with seal oil and make it unnecessary to use high pressure seal oil pumps with control valves. Auxuliary packing glands can be furnished where safety requirements make it mandatory to control closely the vent vapors.

The type G mechanical seals are installed in Worthington refinery type process pumps as optional equipment for pressures up to 500 psi and temperatures up to 250 deg. F. Interchangeability is kept at a maximum by using three sizes of seals for 24 different sizes of process pumps. Modifications can be made in these seals for higher pressures and temperatures. The same general design of seal is used for high pressure, high speed pipeline pumps where continuity of service is an important factor, and where leakage is expensive and highly undesirable.

New Methods require
PREFORMED
WIRE ROPE
When increased production is a must . . . or when new equipment is installed, Preformed wire rope offers definite advantages. Here's why:
● Preformed saves time and money —on installation and in operation
● Preformed handles easier, faster, safer
● Preformed performs better, particularly over small sheaves
● Preformed lasts longer
Whatever your methods may be, if wire rope is involved, make sure it's Preformed. Ask your manufacturer or supplier for Preformed.

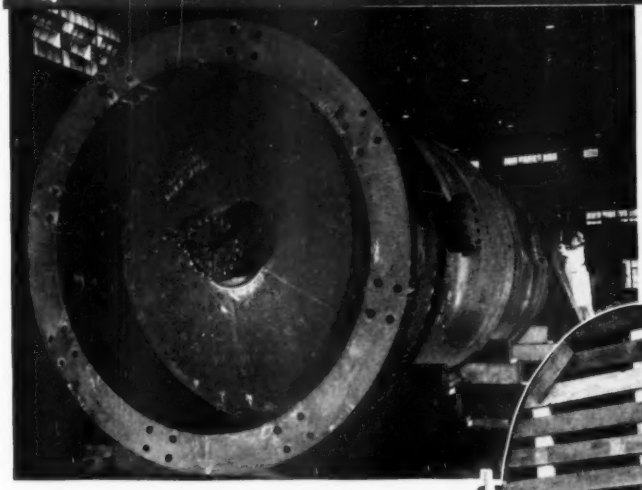
VESSEL DIVISION

NEWS

A. O. Smith 75th Anniversary 1874 · 1949

A. O. SMITH Corporation

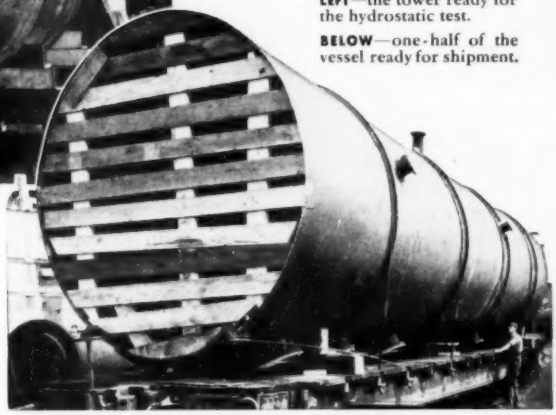
New York 17 · Philadelphia 3 · Pittsburgh 19 · Atlanta 3 · Chicago 4
Tulsa 3 · Houston 2 · Seattle 1 · Los Angeles 14
International Division: Milwaukee 1



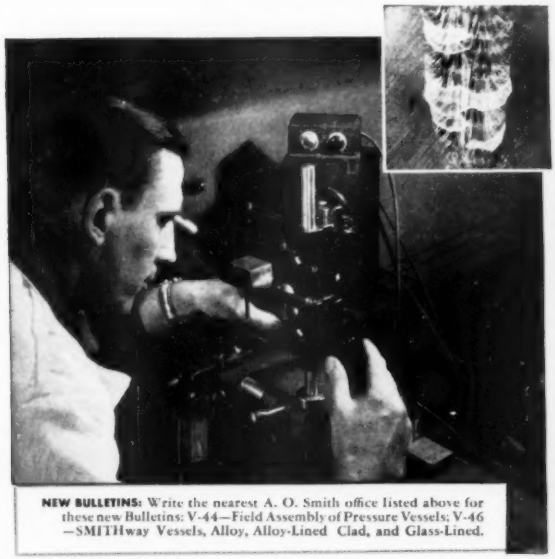
A. O. SMITH TAKES THE GUESS WORK OUT OF FIELD ASSEMBLY. Railroad shipping restrictions made it necessary to field-assemble this 11½ ft. dia. x 116 ft. long SMITHlined Fractionating Tower. To insure ease of assembly in the field, it was first manufactured and completely assembled in the A. O. Smith Milwaukee Plant, then hydrostatically tested, cut in two at the center girth seam, rescarfed for welding in the field, and shipped. Field-assembly costs were cut to a minimum with only one girth seam to be welded.

LEFT—the tower ready for the hydrostatic test.

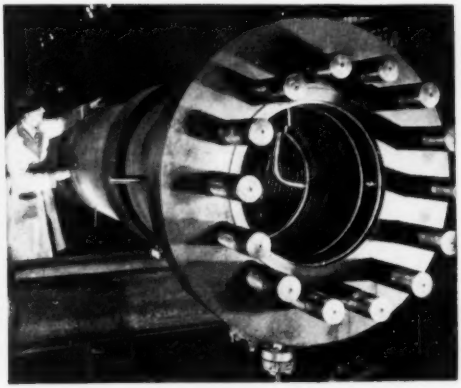
BELOW—one-half of the vessel ready for shipment.



MANY TESTS BEYOND CODE REQUIREMENTS are a regular part of A. O. Smith vessel production control procedures. Here Bill Poehlman, a 20-year veteran, in charge of spectroscopy and X-Ray research, checks the deposited weld metal composition in a vessel test plate, by means of an A. O. Smith-developed microspectrographic technique.



IN STOCKHOLM, SWEDEN, they know about the famous SMITHway welded Multi-Layer vessel construction. Here is one of two SMITHway Inconel-lined Multi-Layer Autoclaves for fatty acid service, with a shell thickness of 5 inches and an operating pressure of over 5,000 psi. This vessel was shipped direct by ocean-going ship from Milwaukee to Stockholm.



NEW BULLETINS: Write the nearest A. O. Smith office listed above for these new Bulletins: V-44—Field Assembly of Pressure Vessels; V-46—SMITHway Vessels, Alloy, Alloy-Lined Clad, and Glass-Lined.

OCTOBER 16th-22nd proclaimed OIL PROGRESS WEEK!

Here's what YOU can do to make the most of this special occasion!

DURING THE WEEK OF OCTOBER 16th-22nd, your community's attention will be focused on the oil industry! For that's the date of Oil Progress Week—the week that gives you a chance to report the progress you and your industry have made.

Last year, Oil Progress *Day* gave thousands of oil men across the country a great chance to tell their story—and they did—with results that paid off handsomely in good will and good business. This year, with an entire *week* devoted to the event, you've got an even greater opportunity to explain how your firm is helping to provide America with *better*, more efficient oil products . . . higher standards of service.

You're the One Who Gains!

YOU gain when your customers understand the competition in oil—the way you compete with rival companies to win customer approval. For as the public learns what a great job you're doing, they'll understand why your business freedom means *more* oil products, *better* oil products, better service for *them!*

Get Ready For Your Big Week!

Get free material to promote Oil Progress Week from your local O.I.I.C. office. You can adapt it to fit your needs. Tie in ads . . . sample speeches . . . booklets . . . motion pictures . . . employee meeting material . . . poster designs . . . radio material . . . everything you need to make Oil Progress Week *your* week!

Get in touch with your local O.I.I.C. office NOW! Or write to national office address listed below.

OIL INDUSTRY INFORMATION COMMITTEE

50 West 50th Street • New York 20, N. Y.

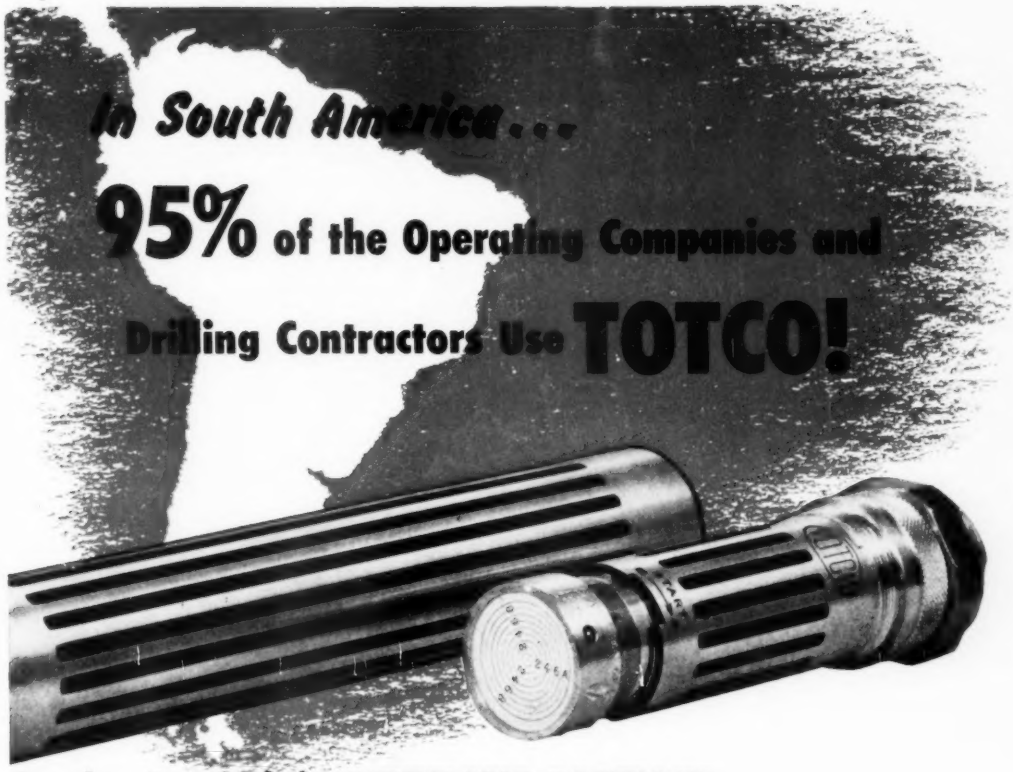
Here's how you can benefit from Oil Progress Week

During Oil Progress Week get people acquainted with your business. That way, your neighbors will get a new understanding of the problems you face . . . an understanding that's *bound* to result in more friends for YOU! Tell them about today's new and better oil products . . . how *hard* you've worked to maintain and step up your high standards of quality and service—and you create good will that pays off for you and your firm in the long run!

Get in touch with your district committee *NOW!*

They'll make it easy for you to make the most of Oil Progress Week. They'll give you material you can use to tie in your name and your business with this big nationwide report!

Don't miss this chance to stand out in your community! Make Oil Progress Week Your Week!



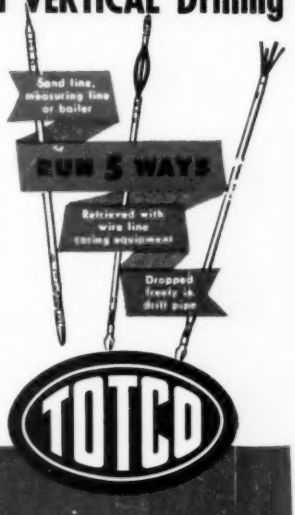
Another Proof of the DEPENDABLE ACCURACY of TOTCO RECORDERS for Controlled VERTICAL Drilling

RECENTLY A CHECK of every drilling area in South America disclosed the fact that TOTCO RECORDERS are used by 95% of the operating companies and drilling contractors! What a testimonial to the value of TOTCO RECORDERS and Controlled Vertical Drilling methods for drilling oil wells faster, cheaper and more efficiently.

In United States fields, too, the use of TOTCO RECORDERS and Controlled Vertical Drilling methods is a vital part of the standard practice of drilling contractors and oil companies alike – and has been for many years.

Yes, the preference for TOTCO RECORDERS is firmly based on their proved dependability, accuracy, and fast operation for Controlled Vertical Drilling.

Totco equipment is leased or rented in the U.S.A.; sold for export only.


Sand line, measuring line or bailer
RUN 5 WAYS
Retrieved with wire line coring equipment
Dropped freely in drill pipe
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If any phase of your pipe line operation is below peak performance, it may be solved by one of the following steps:

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Analysis and Investigation

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Water Main Reconditioning

Related Construction

The experience of thousands of successful pipe cleaning operations insures fast and competent service in any of the phases listed. Why not take advantage of this service in considering the solution of your pipe line problems.

Call the nearest Pittsburgh Pipe Cleaner Company engineer. He will be glad to discuss details of improving your pipe line operation and maintaining it at peak performance . . .

In line with our complete service policy, Pittsburgh Pipe Cleaner Company now features this additional service . . . expert application of the following plastic coatings to reduce pipe line corrosion: GACO-NEOPRENE, GACO-NEOFLEX, GACO-NITROCOTE, GACO-DURAFILM, AND GACO-"316." Write today for additional information.

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YOUR PUMPER IS A *Bigger* MAN NOW!

Free Pumping has increased the stature of your pumper and his importance to your organization. He has been made independent of outside help. He doesn't have to call in a pulling crew or service unit when he wants to surface the bottom hole pump. He just turns a valve.

The compact central plant, from which he regulates the pumping rate of each well and where he gathers all essential bottom hole information, further adds to his capacity for doing a better job. This centralized control reduces well spacing to 18 inches, which is equivalent to equipping your pumper with "seven league" boots. He can visit every well and not leave the header manifold. That gives him an opportunity for necessary maintenance work.

Yes, your pumper is a much bigger man today, if you are giving him Free Pumping equipment to work with.

Why not enjoy the operating economies and saving on equipment made possible by Free Pumping? Your local Kobe representative has some interesting facts to show you.

Free Pump

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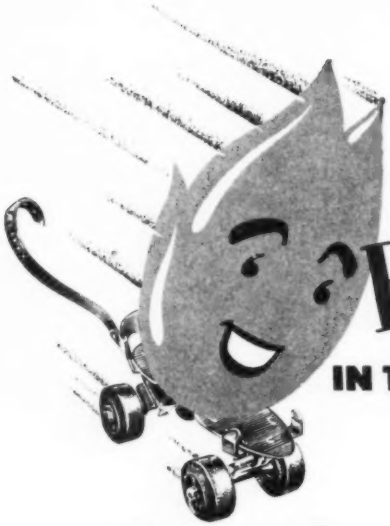
KOBE, INC. *General Offices:* Huntington Park, Calif. *Division and District Offices:* Avenal, Bakersfield, Huntington Park and Ventura, Calif.; Rangely, Colo.; Ardmore, Oklahoma City and Tulsa, Okla.; Brownfield, Corpus Christi, Fort Worth, Houston, Longview, Odessa and Wichita Falls, Texas; Brookhaven, Miss.; Hobbs, N.M.; Great Bend, Kansas; New York City.

THESE ARE THE DAYS OF FREE PUMPING



WHAT...LOWER YOUR

B.T.U. COSTS

IN THE FACE OF HIGH FUEL PRICES?

You Can!

With fuel costs sky high...with competition becoming keener daily...something *has* to be done to get more out of every available B. T. U....*and something can be done!*

Perhaps you *did* carefully survey your fuel economy a few years ago to determine whether an investment in heat exchanger equipment would be profitable.

Perhaps yours was a marginal case and you *did* find that the investment at that time was not warranted. Like others who have *recently* recalculated, however, today you may find that heat exchangers *can* lower your B. T. U. costs substantially...especially because of two noteworthy developments.

1. A vast research program at Ross has boosted the heat conserving performance of traditionally efficient Ross Exchangers.
2. Wide spread Ross standardization has brought about low unit cost.

In combination, these industry-leading feats have, for comparatively nominal investments, pulled down B. T. U. costs for many a plant by eliminating needless and costly waste. This applies not only to first-time users of exchangers, but long-time users as well who are now finding that adding Ross equipment pays off...*quickly!*

Ross Heater & Mfg. Co., Inc., Div. of American Radiator & Standard Sanitary Corp., 1417 West Ave., Buffalo 13, N. Y. In Canada, Horton Steel Works, Ltd., Fort Erie, Ont.

★ Whether or not you have made a recent heat consumption survey, why not consult a Ross heat exchanger engineer now? No obligation in finding out from him how to increase the B. T. U. return from every fuel dollar you spend.

ROSS

EXCHANGERS...*MAKE OTHER PRODUCTS BETTER*

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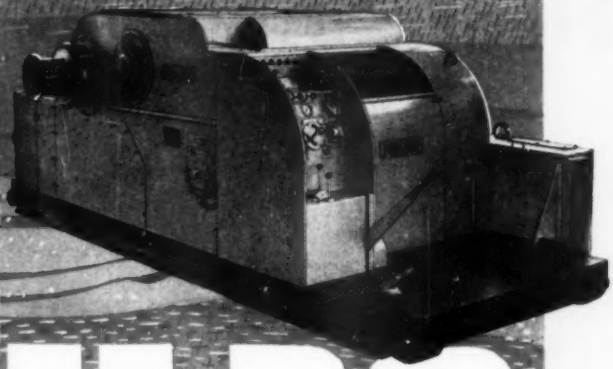
When you've got to go DEEP....



U-30

The U-30, designed for deepest well drilling, is one compact unit that can easily be moved on ONE truck. Write for complete information.

When oil is deep, go after it with confidence. Put a Unit Rig Model U-30 on the job and learn the meaning of fast, efficient drilling. The several years of intense engineering work that brought the U-30 from the drawing board to field is paying off in satisfaction for Unit Rig customers. Yes, when you've got to go DEEP . . . specify the U-30, the compact, portable unit with finger-tip controls.

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UR-A-12

60 Million Miles of Fleet Research

COOPERATIVE TESTS, made possible by Ethyl's close relations with automotive companies and operators of commercial fleets, have provided information on more than 60,800,000 miles of road operation. Commercial fleet testing is the final step in Ethyl's extensive research program aimed at developing the best antiknock fluids for the oil industry.

Refiners benefit two ways

In addition to contributing to continually improved antiknock fluids, Ethyl's carefully controlled fleet programs provide refiners two major benefits:

(1) Basic information on the performance of different types of gasolines and oils operating under a wide range of service conditions . . .

thus refiners often find it possible to reduce the amount of expensive fleet research necessary to obtain similar basic data.

(2) A fund of information on improved maintenance practices which often point the way to more satisfactory use of petroleum products.

Although the Laboratories each year conduct thousands of hours of research on single-cylinder engines, on full-scale engines connected to dynamometers, and on Ethyl-owned fleets of passenger cars and trucks at Detroit and San Bernardino, the Laboratories have never been satisfied to accept the results of any one of these steps as conclusive.

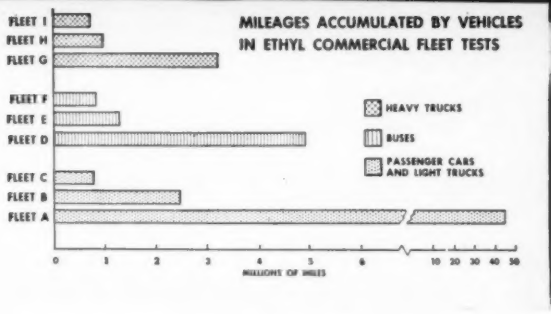
Despite the meticulous care exercised in the conduct of laboratory research programs, uncontrollable variations in engines of the same make and model often introduce extraneous effects. Furthermore, there is always the possibility that actual field service involves variables not included in laboratory studies. Both of these difficulties are met by Ethyl through carefully controlled tests in commercial fleets operated under a wide range of conditions. Ethyl commercial fleet tests are planned to be representative of the types and makes of vehicles in production, the variety of loading and operating schedules normally employed, and the weather and topographical conditions encountered in service in different parts of the country.

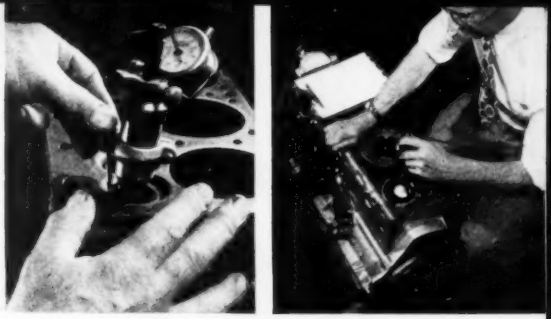
The scope of Ethyl's research conducted in commercial fleets is illustrated by the wide variety of problems investigated. Chart at right.

The fleet of the Dayton Power and Light Co. has been used since 1928 in carefully controlled research programs in cooperation with Ethyl.

ETHYL FLEET INVESTIGATIONS

PROBLEMS INVESTIGATED	FLEET								
	A	B	C	D	E	F	G	H	I
BEARING WEAR									
CYLINDER BORE WEAR									
CARBON ACCUMULATED									
ENGINE CLEANLINESS									
GASOLINE ECONOMY									
OIL ECONOMY									
OCTANE NUMBER REQUIREMENT									
PISTON RING WEAR									
SPARK PLUG LIFE AND PERFORMANCE									
VALVE LIFE AND PERFORMANCE									





Determinations of valve seat run-out (left) and cylinder bore diameter (right) are typical of the "before and after" measurements done on fleet units . . . both accomplished with the aid of equipment specially developed by Ethyl.

Under the close supervision of experienced Ethyl engineers, valuable information on the performance of fuels and crankcase lubricants in commercial vehicles has been obtained in large city bus operations.

How this Ethyl fleet research is conducted

In the conduct of an Ethyl commercial fleet test, comprehensive control of the entire research program is the responsibility of an experienced Ethyl engineer assigned to the project. He works out the details of the test with the management of the fleet so that vehicle operation proceeds in a normal and satisfactory manner. He also is responsible for making certain that procedures and controls provide reliable data . . . without introducing changes in the operation which would destroy the usefulness of the fleet as an index of commercial operation. Mechanical work on engines, vital to the conduct of the test, is often performed by specially trained mechanics from the Ethyl Laboratories.

The uniformity of fuel quality required during a test program sometimes necessitates the installation of additional fuel storage tanks and of equipment for mixing "Ethyl" antiknock compound with base gasoline. Many of the special instruments and forms developed by the Ethyl Laboratories for use in their own road test operations are employed in commercial fleet tests. Frequently the Laboratories purchase, break in and prepare new engines for installation in the test fleet. At the conclusion of the research program, these engines are removed from the vehicles and returned to the Laboratories for extensive inspection, measurement and photography.

Ethyl has developed many special technical forms to record data obtained in fleet tests.

This message is the sixteenth in a series dealing with problems faced by refiners in producing gasoline for today's and tomorrow's engines, and the contribution of the Ethyl Corporation to their solution.

SINCE 1923—*Continuous Research to Provide Better Antiknock Service*

ETHYL CORPORATION

RESEARCH LABORATORIES

DETROIT, MICHIGAN . . . 1600 WEST EIGHT MILE ROAD

SAN BERNARDINO, CALIFORNIA . . . 2600 CAJON ROAD

"IT WAS LIKE THIS . . . *the deeper we went, the tougher the going—but, the joints held tight and the walls stood up*

—because we were using

NATIONAL SEAMLESS

all the way down!"

ONCE a deep-hole man has worked a well with U·S·S NATIONAL Seamless Drill Pipe, Casing, and Tubing and experienced the *freedom from down-the-hole trouble*, he becomes "sold" for life on these superior oil country goods.

As an example of the kind of dependable service you can expect, consider Stanolind's experience in sinking its No. 1 Briscoe Unit in Grady County, Oklahoma, without a single fishing job! Reports state that there was no time lost and no consequential down-the-hole trouble encountered in running the string of 7" O. D. NATIONAL Seamless Casing to a depth of 13,670 ft. and the string of 2-7/8" O. D. NATIONAL Seamless Tubing to 14,190 ft.

Pierced from solid billets of steel, NATIONAL Seamless Tubular Goods have no welds—no line of potential weakness. Furthermore, they have been improved both in steel composition and physical properties to give them higher collapse resistance and increased joint strength—factors which are of utmost importance in these days of deep drilling. For complete data, write National Tube Company, Frick Building, Pittsburgh, Pennsylvania. Ask for a copy of Bulletin No. 15.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

UNITED STATES STEEL EXPORT COMPANY, NEW YORK

WALLS WITHOUT WELDS

USS

NATIONAL SEAMLESS

drill pipe . . . casing . . . tubing

UNITED STATES STEEL

RATE OF CORROSION REDUCED 98%

with **KONTOL**

A CORROSION PREVENTIVE DEVELOPED AND MANUFACTURED BY THE TRETOLITE COMPANY

REDUCES FREQUENCY OF WELL-PULLING — Effective corrosion prevention increases the useful life of rods, tubing and pumps.

STOPS PITTING — In the majority of cases, the tendency toward pitting is eliminated.

EASY TO USE — Just pump or dump periodically down well annulus.

ECONOMICAL — One quart per million feet of gas, or ratio of one to 10,000 in oil wells.*

*Ratios based on average of tests to date. Particularly corrosive conditions may call for more Kontol — mild conditions for less.

Extensive testing has shown that in the average corrosive gas-condensate well, the injection of one quart of KONTOL per million cubic feet of gas produced will reduce the corrosion rate of well equipment by 90% or more – *reductions by as much as 98% are not unusual.* KONTOL is equally effective in reducing corrosion in gas, gas-condensate, sweet crude and sour crude wells.

INVESTIGATE KONTOL NOW

It is already saving time, labor and steel for many producers. For detailed information on KONTOL, or particulars regarding the KONTOL rate of corrosion test service, just call or write

KONTOL

CORROSION PREVENTIVES

TRETOLITE COMPANY

Manufacturing Chemists

St. Louis 19, Missouri
Los Angeles 22, California

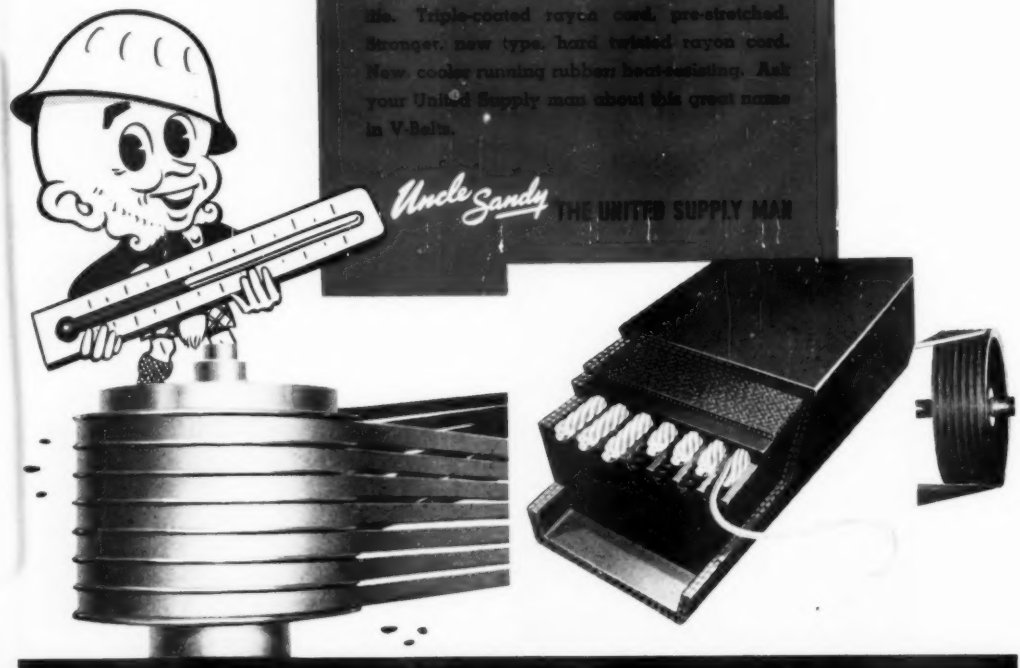
KG-49-3

great names

B. F. Goodrich

This great name assures you of longer V-Belt life. Triple-coated rayon cord, pre-stretched. Stronger, new type, hard twisted rayon cord. New, cooler running rubber heat-resisting. Ask your United Supply man about this great name in V-Belts.

Uncle Sandy THE UNITED SUPPLY MAN



Courtesy
Service
Dependability

UNITED SUPPLY
AND Manufacturing COMPANY
TULSA, OKLAHOMA
Stores in Kansas, Oklahoma, Texas,
Louisiana, and New Mexico

DUPONT TETRAETHYL LEAD COMPOUNDS

Piston top deposit, heavy duty, constant speed conditions.

DuPont Research

at Work on the Chemical Nature of Engine Deposits

Exhaust valve head deposit, heavy duty, constant speed conditions.

It has long been recognized that combustion chamber deposits greatly affect fuel performance . . . but little has been known about the relationship between deposit composition and effect on combustion.

As a part of its long-range Petroleum Chemicals research program, Du Pont is making an intensive study of the chemical nature of these deposits, and their effect on fuel performance. By a better and more complete understanding of the over-all deposit problem it is hoped that better scavenging agents or other additives may be developed which will help in the production of improved fuels . . . today and in the future.

DU PONT

REG. U. S. PAT. OFF.

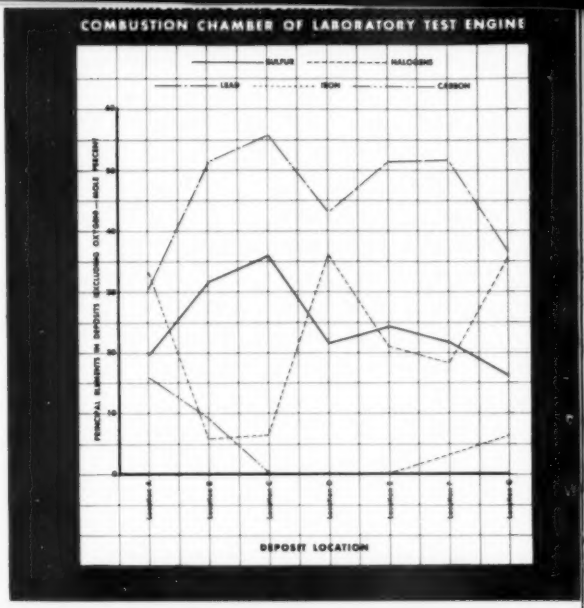
Better Things for Better Living . . . *Through Chemistry*

Investigating Engine Deposits for their effect on Fuel Performance

All liquid fuels burned in internal combustion engines produce combustion chamber deposits, the composition of which will vary with the hydrocarbon composition of the fuel, the type of lubricating oil and the presence or absence of tetraethyl lead. Investigation into the composition of deposits from leaded gasolines has shown that in addition to simple compounds they consist of complex mixtures of compounds. Among those definitely identified to date are the eleven listed below.

The most modern X-ray diffraction apparatus and other specialized equipment is used in the analysis of deposits, identifying the different compounds formed under various operating conditions and at various locations within the engine.

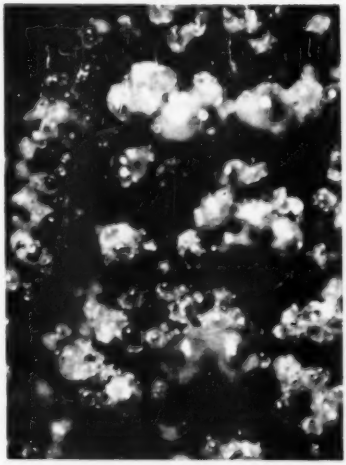
This is research upon specific and recognized problems working toward answers which will benefit the entire industry.



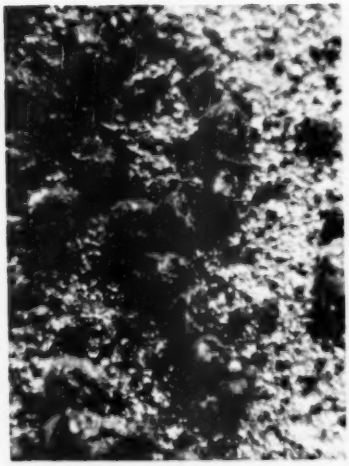
DEPOSIT COMPOSITION

The following lead compounds are some that have been identified to date in combustion chamber deposits in addition to those contributed by the base fuel and lubricating oils.

PbO
$PbSO_4$
$PbSO_4 . PbO$
$PbSO_4 . 2PbO$
$PbSO_4 . 4PbO$
$PbBr_2$
$PbCl_2$
$PbBr_2 . PbCl_2$
$PbBr_2 . 2PbO$
$PbCl_2 . 2PbO$
$PbCl_2 . PbO$



Photomicrograph of deposit from piston top.



Photomicrograph of deposit from intake valve stem.

DU PONT
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Better Things for Better Living . . . *Through Chemistry*

MAKE DU PONT THE SOURCE FOR ALL OF YOUR GASOLINE ADDITIVES . . .

Tetraethyl Lead Compounds
Motor Mix—Aviation Mix
Antioxidants
Metal Deactivator—Dyes

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
PETROLEUM CHEMICALS DIVISION
Wilmington 98, Delaware

District Laboratories: Wilmington, Del. · Chicago, Ill. · Tulsa, Okla. · Houston, Texas · El Monte, Calif.

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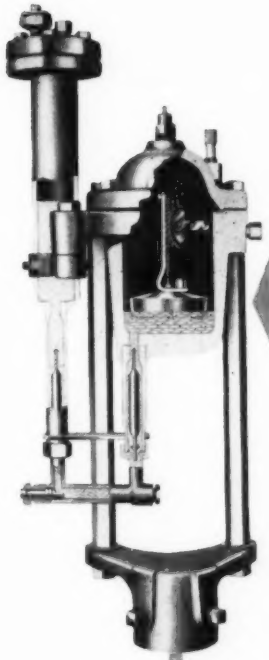


Proper float location gives you EXTRA METER VALUE

HERE'S HOW TEMPERATURE ERRORS ARE CANCELED

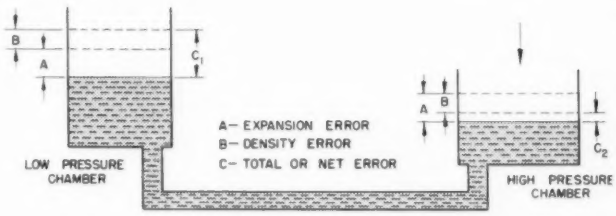


Diagram shows two distinct ambient temperature error factors (exaggerated for clarity) which affect the accuracy of mercury displacement type flow meters. On an increase in temperature, for example, the mercury expands and its level rises an equal amount (A) in both high and low pressure chambers. Mercury density also decreases because of the same increase in temperature, resulting in increased displacement (B) for a given differential pressure change. This increased displacement adds to error (A) in the low pressure chamber, causing a combined error C_1 — but *subtracts* from error (A) in the high pressure chamber, leaving only a negligible net error (C_2).

Better Design Throughout Assures Greater Accuracy with Foxboro Meters

Engineering thoroughness in every detail throughout Foxboro Flow Meters demonstrates conclusively why you get *extra meter value*. Locating the meter float in the high-pressure chamber is only one of many examples. Based on broader understanding of basic principles, this simple design feature utilizes two inherent sources of thermal error to offset each other. The result is highest sustained accuracy through the range of the instrument, regardless of temperature variations.

Even for your simple installations, you'll save money in the long run by employing Foxboro Meters. Write for Bulletin 351-2 describing these extra-values. **The Foxboro Company, 60 Neponset Avenue, Foxboro, Mass., U. S. A.** Branches in 32 U. S. cities—also 6 Canadian cities.

EXCLUSIVE FOXBORO REFINEMENTS

- Segmental Lever Transmission gives *truly* straight-line calibration.
- Extra-large Float with long travel gives extra power.
- Sure-Seal Check Valves, submerged in mercury, positively prevent mercury losses from overrange.
- Pressur-Tite Frictionless Bearing eliminates stuffing box and packing.

FOXBORO REG. U. S. PAT. OFF.

DIFFERENTIAL-TYPE FLOW METERS

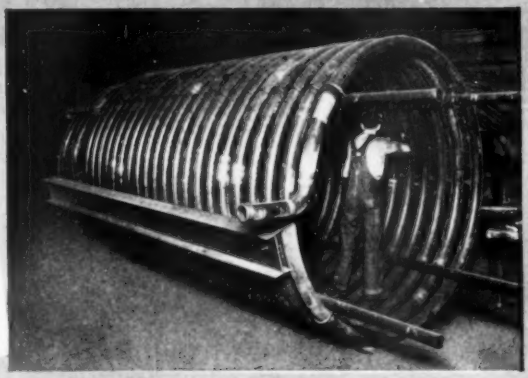
MIDWEST PIPE COILS

ANY SIZE . . .
ANY SHAPE . . .
ANY PIPING MATERIAL . . .
FOR ANY PURPOSE

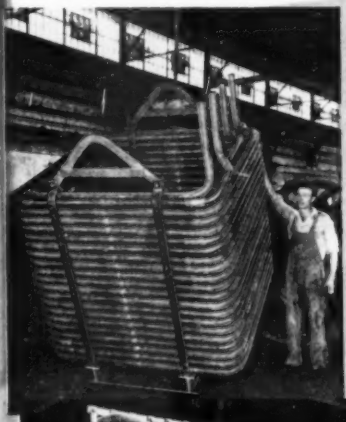
Whatever your pipe coil requirements may be . . . whether carbon steel or alloy . . . Midwest has undoubtedly fabricated similar units. This experience . . . aided by the special coiling equipment developed by Midwest . . . is the reason why many of the most exacting coil users prefer coils by Midwest.

Midwest coils are accurate to dimension, thoroughly pressure tested, stress relieved when necessary, carefully cleaned . . . ready for long, satisfactory service.

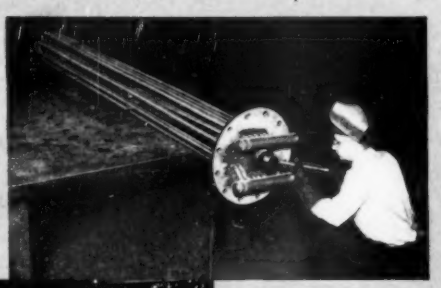
Midwest engineers will gladly assist you in the solution of your pipe coil problems. Get in touch with the nearest office.



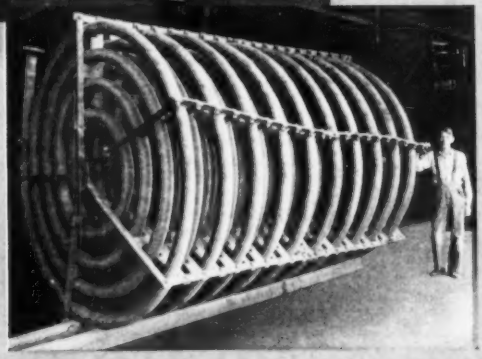
Cylindrical end of polymerization heater coil approximately 8 ft in diameter and containing 850 ft of 4" standard Grade "A" seamless steel pipe.

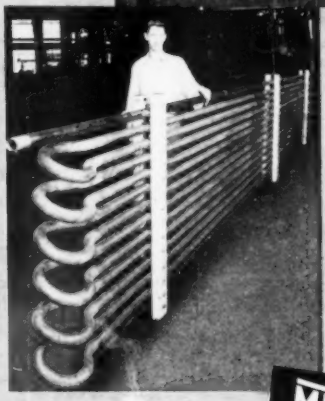


A nest of box coils containing 850 ft of 2" extra strong seamless pipe, to be used as storage tank heater.



Catalytic reactor coil consisting of 20 flat spirals of 4½" OD x ¼" wall 4-6% chrome, ½% moly seamless pipe. Full-furnace annealing distorted temporary shipping straps.





Nested hairpin coil used as unit heater in 14' diam tank; made from 300 ft of ¾" OD x #14 BWG seamless boiler tubing.

Condenser coil fabricated from 2" OD x 3/16" wall seamless steel pipe. Coil was tested to 7500 psi and is 26 ft long.

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Main Office: 1450 South Second St., St. Louis 4, Mo.
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MIDWEST PIPING SERVICE IS NATION-WIDE

4 PLANTS ARE BETTER THAN 1

PIPING FABRICATORS AND MANUFACTURERS OF WELDING FITTINGS

STOP SIGN for One-Stop Supply Service

77 stores located on the highways and byways of all the oil country East of the Continental Divide.

Export: 230 Park Ave., New York 17, N. Y.

Especially convenient for Drillers—Producers Pipe Liners—Refiners

Jones & Laughlin Supply Company

Subsidiary of Jones & Laughlin Steel Corporation.

Tulsa, Okla.

J&L STEEL

For Economy and Long Service

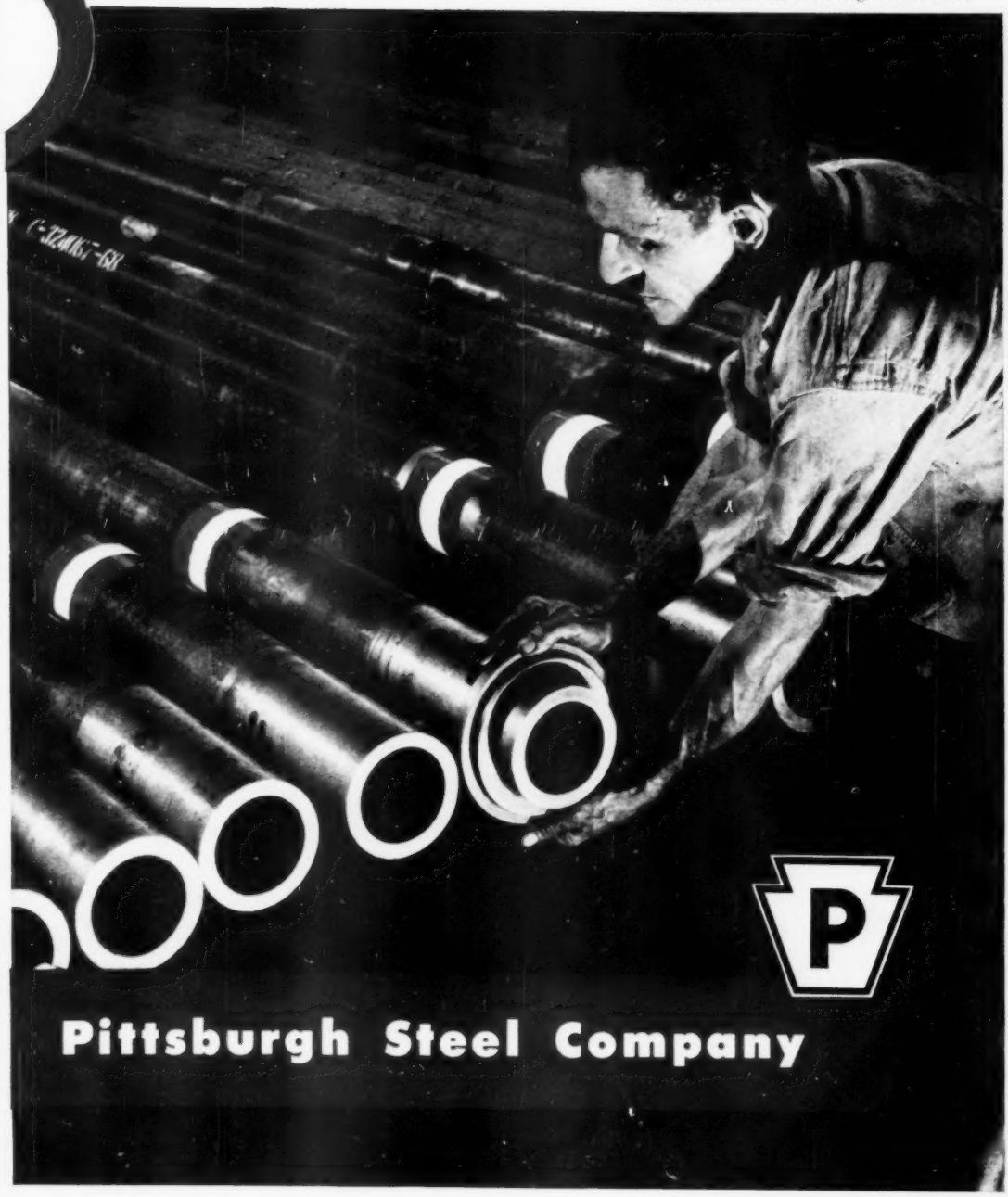
specify

Pittsburgh Still Tubes

You get economy with Pittsburgh Still Tubes because the wide range of grades available makes it possible for you to select the most economical grade for the creep strength or corrosion resistance you desire. And, you get long service from any grade of Pittsburgh Still Tubes as they give uniform resistance to heat, pressure, oxidation and corrosion.

In order to take full advantage of the wide range of analyses ranging from low molybdenum and intermediate chrome-molybdenum alloys to the higher grades, our metallurgical engineers will be glad to help you specify the proper tubes for your next installation. Pittsburgh Still Tubes are made in sizes from 2" to 6" outside diameter (in some cases even larger) and from .134" to 1" average or minimum wall thickness in lengths up to 55' with plain, upset or machined ends. For the greatest economy and longest service in your still tube installations write Pittsburgh Steel Company, Department OG, Grant Building, Pittsburgh 30, Pa.

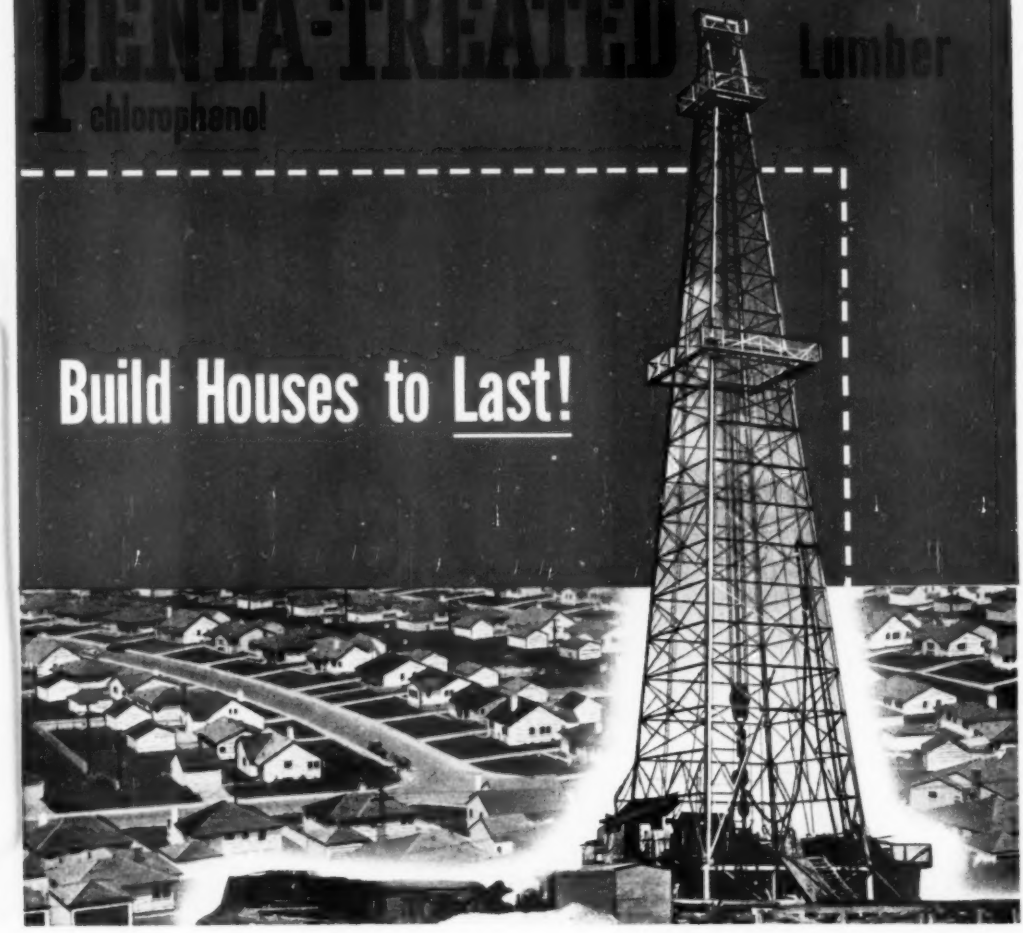
Mike Mazzei checking size accuracy of machined ends on Pittsburgh Still Tubes.



Specify

PENTA-TREATED Lumber

pentachlorophenol



It's economical to use "PENTA"-protected lumber for oil field housing. PENTA water repellent solutions not only protect wood against termites and decay but prevent warping and checking as well.

PENTA-treated wood, properly treated, is paintable and gives *tested, proved* protection under severest climatic conditions.

Whether the houses are permanently located, or built to follow the oil, an investment in PENTA-protection will pay big dividends in reduced maintenance and rebuilding costs. For more information write Dow, Dept. PE 181.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

DOW

penta-
chlorophenol

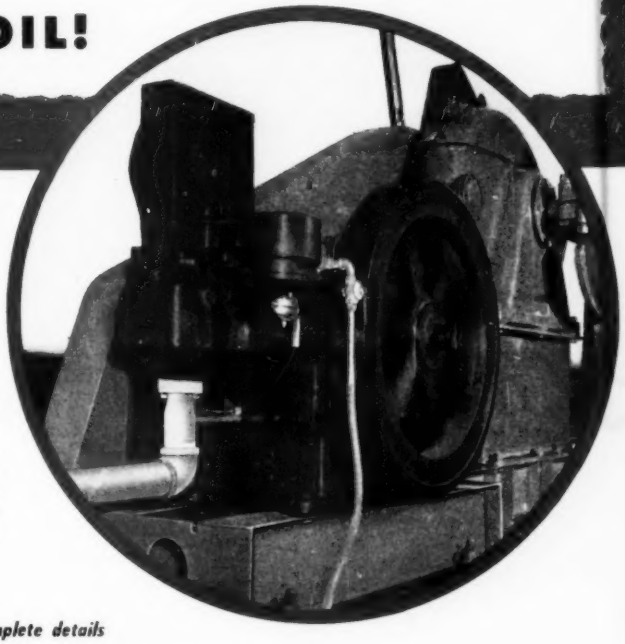
THE BEAVER HAS A PADDLE-SHAPED TAIL*

*Designed for a Specific Purpose

THE CSCO PUMPING ENGINE

. . . Designed for a Specific Purpose

TO PUMP OIL!



For years the oil producing industry was in need of a pumping engine designed for the specific purpose of pumping oil. Until four years ago operators had to be content with engines adapted from those originally designed for other uses. Then, to satisfy this long felt need, Continental introduced the CSCO line of pumping engines.

Every day since the first CSCO went into service, more and more CSCO's have been put to work . . . operating 24 hours a day, month in and month out, under every possible condition.

No other one engine has these important features: Enclosed to conquer dirt . . . Pressure lubricated to conquer wear . . . Steam cooled to conquer heat and cold . . . Heavy flywheel to conquer peak load.

Ask a Continental Man for complete details

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SERVING THE OIL AND GAS INDUSTRIES

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Export Division: 30 Rockefeller Plaza, New York, N. Y.

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Since V-J Day... Report No. 4

A Report to Our Customers
4. To engage in a larger and more comprehensive research and engineering program than any yet attempted by a seismograph contractor.
GEOPHYSICAL SERVICE INC.
DALLAS, TEXAS

IN GSI'S ENGINEERING LABORATORIES

39 Engineers and Technicians are now working on projects

TO Reduce the length of time required to evaluate prospective oil areas.

Increase accuracy of subsurface maps.

Reduce cost of area evaluation.

THROUGH Fundamental research in earth physics.

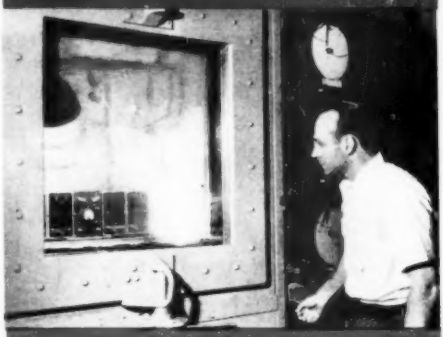
Development of improved field equipment easily operated and maintained.

Advance techniques of testing and evaluating new equipment in the laboratory.

114 Engineering projects are active now. Almost daily, new projects are begun. Thus far in 1949, an average of 32 have been completed each month.

This is a continuous program to improve GSI's equipment and techniques. It results in finding more oil fields, faster and at a lower cost to you.

Developing new seismic instruments



Simulating field weather conditions in the laboratory

Laboratory engineers field testing new recording oscillograph at GSI's proving ground

GEOPHYSICAL SERVICE INC.

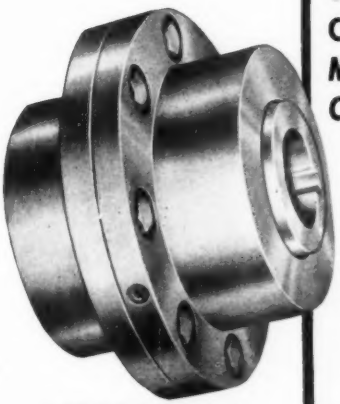
DALLAS, TEXAS

Seek POWER TRANSMISSION *At Its Best*

AMERICAN

FLEXIBLE COUPLINGS

meet every test



AMERIGEAR FLEXIBLE COUPLING

For high speeds or heavy-duty, gear up for direct, free and consistent transmission of power with Amerigear Flexible Couplings.

TWO TYPES OF FLEXIBLE COUPLINGS — *All That Are Needed To Meet Every Service Condition.*

One coupling—the AMERICAN *Flexible Coupling* with full floating center member equipped with removable bearing strips transmits power under all variations common to low speed operation where a maximum degree of flexibility and protection against damage of equipment is required. Another coupling — the AMERIGEAR *Flexible Coupling* provides a means for gearing up for the direct transmission of power under all variations common to heavy duty and high speed operation where only a minor degree of flexibility is required. Thus, do these two types of flexible coupling meet all service conditions.

AMERICAN FLEXIBLE COUPLING

For low speeds, and a factor of greater protection against destructive damage to driven mechanisms, use American Flexible Couplings—the only couplings with a floating center member equipped with replaceable bearing strips.

AMERICAN FLEXIBLE COUPLING CO.

Affiliate of J. A. ZURN MFG. CO.

Over 20 Years of Power Transmission Experience

ERIE, PA., U. S. A.

Sales Offices in All Principal Cities of U. S. A.

A...ERICAN FLEXIBLE COUPLING CO.
Dept. OGJ, Pittsburgh Avenue, Erie, Pa., U.S.A.

We Are Seeking Power Transmission At Its Best. Please send:

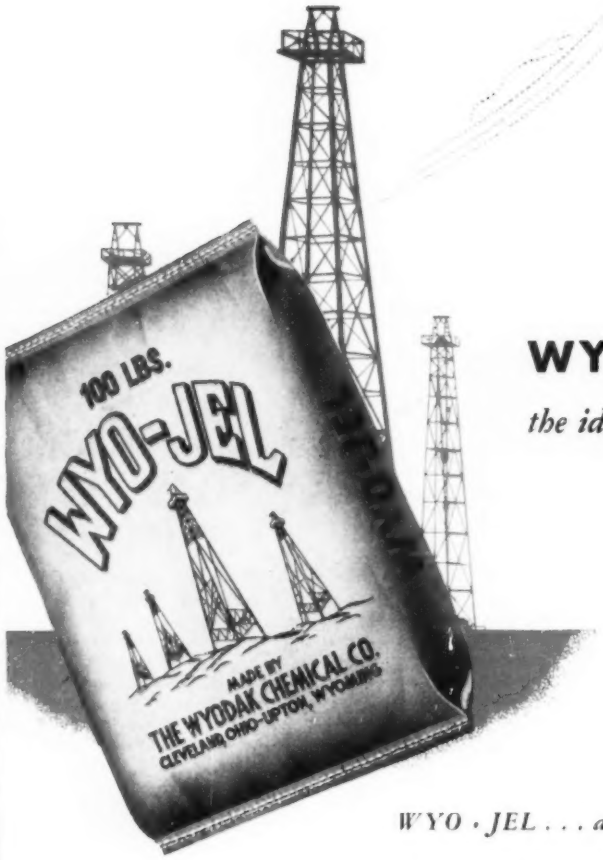
- ☐ Booklet "Relief from Bearing Wear Grief".
- ☐ American Flexible Couplings Catalog No. 481.

Name _____

Company _____

Address _____

Please attach to your business letterhead.



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- Reduces Drilling Costs
- Lengthens Life of Mud
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- Easy to mix
- Universally Used for Many Years

WYO-JEL is easy to mix and absorbs tremendous quantities of water. Cone-and-jet mixers, or any type mud mixer, are satisfactory for mixing Wyo-Jel. World-wide use and acceptance is your guarantee you can't go wrong with Wyo-Jel.

JUST OFF THE PRESS!

New folder describes properties of Wyo-Jel. Includes rotary mud tests and other essential data. A copy will be mailed promptly upon request.

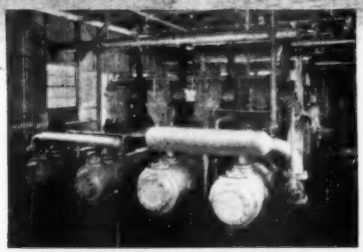
DISTRIBUTORSHIPS AVAILABLE

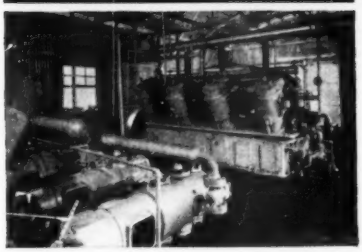
If you are interested in handling Wyo-Jel as a distributor or dealer, please write us.

The Wyodak Chemical Company, 4600 East 71st St., Cleveland 5, Ohio

WYO-JEL

"FLOATING COMPRESSORS" for SHELL OIL'S GAS-LIFT IN LOUISIANA BAYOU SWAMPLAND



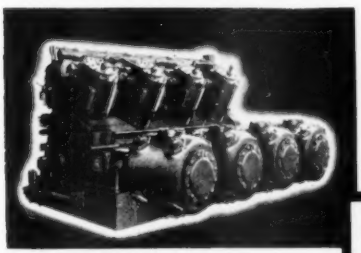


These two XVG gas-powered compressors, operating aboard Shell Oil Company's barge, provide something new in availability, flexibility, and operating efficiency.

This floating compressor plant is used by the Shell Oil Company for gas-lift and sale-gas service in Louisiana bayou swampland where it is almost impossible to get sound footing for a conventional foundation. Because it is completely self-contained, the plant is easily moved from one location to another. The compressor equipment consists of two Ingersoll-Rand 300-hp Type XVG gas-engine-driven compressors, known for their excellent running balance. An I-R Type 30 air-cooled compressor furnishes starting air for the engines.

This is the second compressor barge built for Shell by the Levingston Shipbuilding Co., Orange, Texas. The first, with a single 225-hp Type XVG compressor, has been on gas-lift service at Black Bayou, La., for some time.

These compact, 4-cycle V-angle compressors, designed primarily for oil-field and refinery service, are in use all over the world on all types of jobs . . . with outstanding records of efficiency, dependability, and low up-keep costs. For complete information get in touch with your nearest I-R engineer. He will be glad to explain the advantages of Ingersoll-Rand 4-cycle Vee compressors and gas engines.



Excellent running balance makes Ingersoll-Rand's XVG, and smaller JVG compressors, ideal for service on barges.

- **DEPENDABILITY**
- **LOAD FLEXIBILITY**
- **LOW-COST INSTALLATION**
- **SIMPLICITY**
- **CONSERVATIVE RATING**
- **BALANCE**

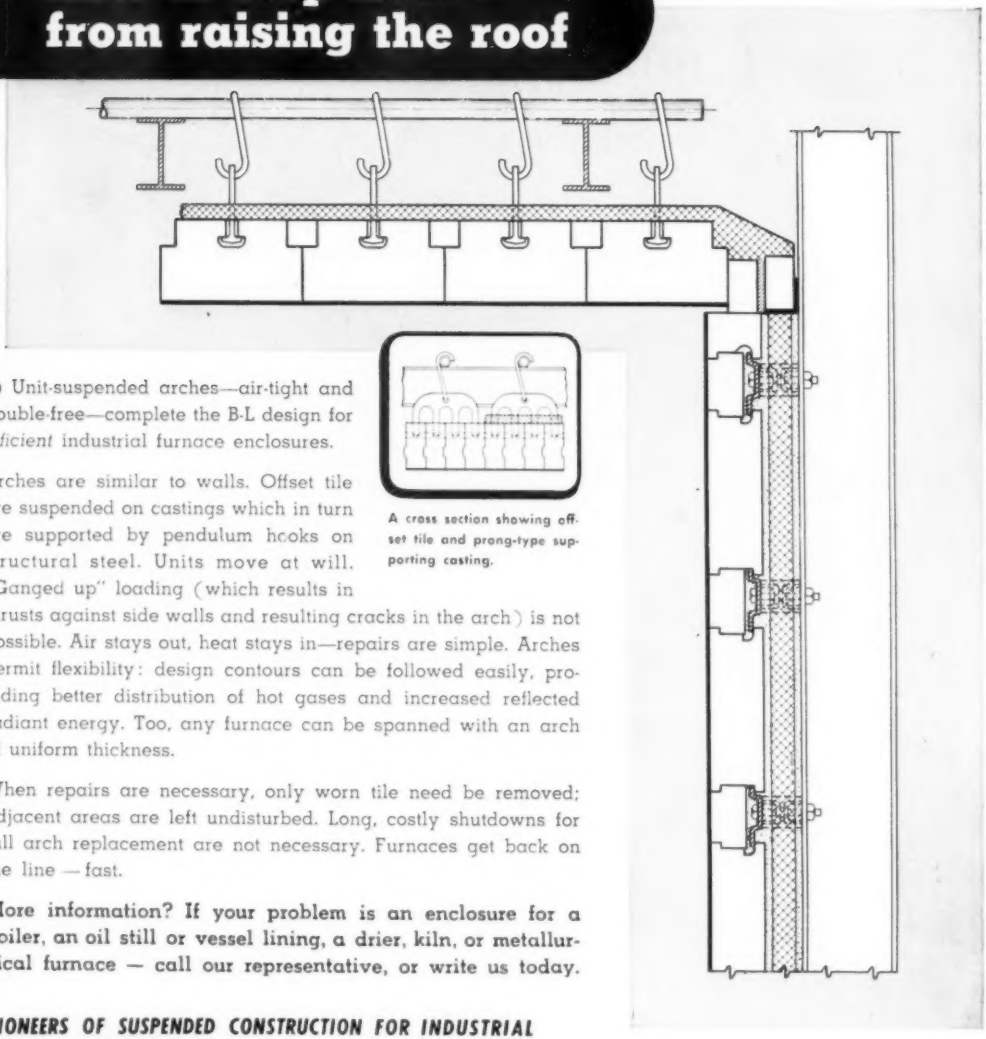
4-CYCLE V

Ingersoll-Rand

436-6 11 BROADWAY, NEW YORK 4, N. Y.

how to stop heat from raising the roof

Arches can be insulated as shown here or air cooled. Note the corner joint and the pendulum-hook supports.



A cross section showing offset tile and prong-type supporting casting.

● Unit-suspended arches—air-tight and trouble-free—complete the B-L design for *efficient* industrial furnace enclosures.

Arches are similar to walls. Offset tile are suspended on castings which in turn are supported by pendulum hooks on structural steel. Units move at will. "Ganged up" loading (which results in thrusts against side walls and resulting cracks in the arch) is not possible. Air stays out, heat stays in—repairs are simple. Arches permit flexibility: design contours can be followed easily, providing better distribution of hot gases and increased reflected radiant energy. Too, any furnace can be spanned with an arch of uniform thickness.

When repairs are necessary, only worn tile need be removed; adjacent areas are left undisturbed. Long, costly shutdowns for full arch replacement are not necessary. Furnaces get back on the line — fast.

More information? If your problem is an enclosure for a boiler, an oil still or vessel lining, a drier, kiln, or metallurgical furnace — call our representative, or write us today.

PIONEERS OF SUSPENDED CONSTRUCTION FOR INDUSTRIAL FURNACE ENCLOSURES . . .

BIGELOW LIPTAK Corporation

BIGELOW-LIPTAK

Unit-Suspended Walls & Arches

SUBSIDIARY OF A. P. GREEN FIRE BRICK CO.

CURTIS BUILDING • DETROIT 2, MICHIGAN

IN CANADA

BIGELOW-LIPTAK OF CANADA, LTD., TORONTO, ONTARIO

DETROIT · CHICAGO · NEW YORK · SEATTLE · SALT LAKE CITY · PHILADELPHIA · MINNEAPOLIS · CLEVELAND · CINCINNATI · PITTSBURGH · SAN FRANCISCO
DENVER · OMAHA · KANSAS CITY, MO. · VANCOUVER, B.C. · HOUSTON · ST. LOUIS · ST. PAUL · BUFFALO · ATLANTA · TULSA · BOSTON · LOS ANGELES

All-New and...

Built to Take It

THE INDUSTRY'S FINEST KING-SIZED CABS

Bigger, roomier, stronger, . . . larger doors, windows, windshields . . . built-in ventilation . . . complete insulation. 520 to 650 conventional models have full-width, three-passenger seats. C.O.E. and 700 to 980 conventionals have separate driver's seat with optional passenger seats.

If your engineering or construction hauling jobs call for heavy duty trucks, you'll find new "H" line GMCs the stand-out trucks of the field!

They're all-new in looks, with high attractiveness and attention value. And they're just as powerful, rugged and comfortable as they look . . . with bigger, better performing gasoline engines and improved Diesel engines . . . deeper, stiffer, better braced frames, Bumper-Built grilles and faster-acting brakes . . . higher, longer, wider cabs that have up to 50 per cent greater visibility, plus a score of new comfort and convenience features.

These new "H" line GMCs are offered in 61 basic models . . . in weight ratings from 19,000 to more than 90,000 pounds. See your GMC dealer for full facts on the best type for your type of heavy hauling.

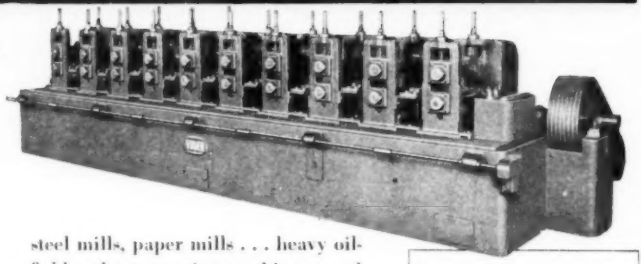
GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

GMC
GASOLINE • DIESEL
TRUCKS

Contact KAYDON *of Muskegon*

FOR ALL TYPES OF BALL AND ROLLER BEARINGS 4" BORE TO 120" OUTSIDE DIAMETER

Smooth rolling for Yoder Roll Formers

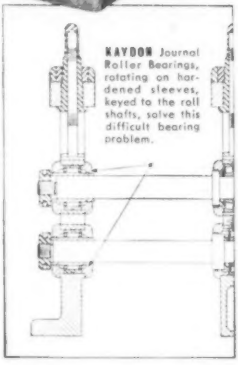


IT'S a rugged business these Yoder Roll Forming Machines are in! They take flat, heavy gauge metal strips and form them into modern moldings, tubular and angular shapes. Under the terrific loads required in the forming operations, roll shafts must operate smoothly. This calls for precision bearings of extreme ruggedness. Husky KAYDON Journal Roller Bearings meet these requirements.

In many types of heavy-duty machinery for metal working industries, steel mills, paper mills . . . heavy oil-field and construction machinery, and similar equipment, KAYDON is helping engineers to improve performance thru advanced bearing applications.

* * *

Counsel in confidence with KAYDON. Capacity now available for all sizes and types of KAYDON bearings . . . and for atmospheric controlled heat treating, precision heat treating, salt-bath and sub-zero conditioning and treatment, microscopy, physical testing and metallurgical laboratory services.


KAYDON Journal Roller Bearings, rotating on hardened sleeves, keyed to the roll shafts, solve this difficult bearing problem.

THE KAYDON ENGINEERING CORP.

KAYDON *Types of Standard or Special Bearings:*
Spherical Roller • Taper Roller
Ball Radial • Ball Thrust
Roller Radial • Roller Thrust

MUSKEGON • MICHIGAN

D+B Rod Liner PUMPS

FOR THE MOST SEVERE PUMPING SERVICE
WHERE ONLY FINEST QUALITY PUMPS SURVIVE

D+B Rod Sectional Liner Pumps are designed, engineered and constructed to provide efficient and economical service under the most severe operating conditions. The precision sectional liner provides a straight, true liner column through which plunger can operate freely.

The advanced design, combined with use of highest quality materials and precision workmanship make D+B Rod Liner Pumps unsurpassed for efficient handling of gassy, sandy or corrosive production from "problem" wells. They are available in a full range of sizes and lengths, with any desired combination of fittings to efficiently pump from any depth in any well condition—a fitting complement to the world famous D+B line of deep well pumps and sucker rods.

STATIONARY BARREL WITH TOP OR BOTTOM HOLD-DOWN

Recommended for corrosive, sandy or gassy production from crooked or slant holes. Regularly equipped with chrome-plated plungers, H-C-I or "Endurall" liners, double valves, Armored or Endurall closed cages, and Superloy balls and seats. Available with either 3-cup or exclusive D + B Simplex top or bottom lock hold-down.

TRAVELING BARREL WITH BOTTOM HOLD-DOWN

Recommended for gassy and sandy production. Particularly effective in moderate sandy conditions with intermittent operation. Standard equipment includes chrome-plated plungers, H-C-I or "Endurall" liners, double valves, Armored closed cages and Superloy balls and seats. Available with 3-cup, A.P.I. or exclusive D + B Simplex bottom lock hold-down.

TRAVELING BARREL CHAMPION WITH BOTTOM HOLD-DOWN

An inverted insert type pump with either 2 or 3 liners and extension tube. Plunger acts as both pull tube and plunger, reducing number of parts and joints. Recommended for sand, shale, or corrosive well conditions. Wiping action of short liner column prevents intrusion of sand between working surfaces. Oversize standing valve, connected to upper end of plunger, permits free, unobstructed fluid flow.

CHROME-PLATED PLUNGERS

All D+B Rod Liner Pumps are normally equipped with chrome-plated plungers. They are made from thick-walled, seamless steel tubing, heavily chrome plated. They are accurately ground and polished to size and fit desired to assure a perfect seal. D+B "Endurall" plungers for extreme corrosive service may be used.

LINERS

Hardened cast iron (H-C-I) liners for ordinary pumping, or stainless steel "Endurall" liners for severe service, are normally supplied with D+B Rod Liner Pumps. All D+B liners are centrifugally cast to provide a uniform dense structure free from impurities. They are honed to a mirror-like finish and have a precisely controlled hardness for maximum wear resistance. Standard and Armored liners are available.

DOUBLE VALVE ASSEMBLY

D+B Rod Sectional Liner Pumps are equipped with double valve assemblies. They are designed to permit free, unobstructed fluid flow and to provide correct amount of ball lift and side clearance. Gas spinning of ball is eliminated. In operation, the double valve assembly insures perfect seating and long, trouble-free service.

For additional information on D + B Rod Liner Pumps ask for Bulletin No. 611-A

CONTINENTAL

SERVING THE OIL AND GAS INDUSTRIES

D+B DIVISION EMSCO DERRICK & EQUIPMENT COMPANY
LOS ANGELES, CALIFORNIA DALLAS, TEXAS

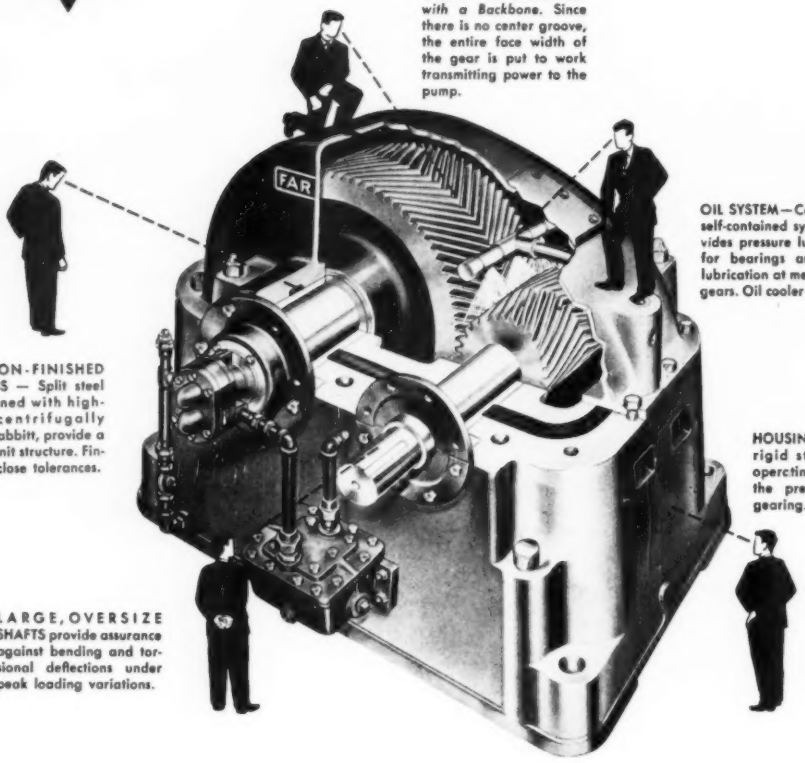
Mid-Continent Distributor: THE CONTINENTAL SUPPLY COMPANY, Dallas, Texas
Export Distributor: THE CONTINENTAL SUPPLY COMPANY, INC., New York, N. Y.

D+B

DEEP WELL PUMPS AND SUCKER RODS

FROM ANY ANGLE

Farrel Speed Increasers Have Advantages



PRECISION - GENERATED GEARS—*the famous Gear with a Backbone.* Since there is no center groove, the entire face width of the gear is put to work transmitting power to the pump.

OIL SYSTEM—Completely self-contained system provides pressure lubrication for bearings and spray lubrication at mesh line of gears. Oil cooler included.

PRECISION-FINISHED BEARINGS — Split steel shells, lined with high-grade, centrifugally poured babbitt, provide a bonded unit structure. Finished to close tolerances.

HOUSING—Exceptionally rigid structure insures operating smoothness of the precision generated gearing.

LARGE, OVERSIZE SHAFTS provide assurance against bending and torsional deflections under peak loading variations.

When you are looking for speed increasers with a combination of features that assure many years of trouble-free operation, you will find that Farrel units fill the bill.

The first to be developed in a standard series, these units have been proved in pipe-line pumping service since 1932. All of the units installed then and since are still in operation, performing as well as on the day they were put into service.

Before you specify gear units, look into the many advantages of the Farrel design. For full information, send for Bulletin No. 448. No obligation.

FARREL-BIRMINGHAM COMPANY, INC., 344 Vulcan St., Buffalo 7, N.Y.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y. *Sales Offices:* Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Detroit, Chicago, Los Angeles.

OIL FIELD REPRESENTATIVES—Hercules-Lupfer Engine Sales Co., 124 N. Boston St., Tulsa 1, Okla. V. W. Osborne, 822-A M & M Building, Houston 2, Texas.

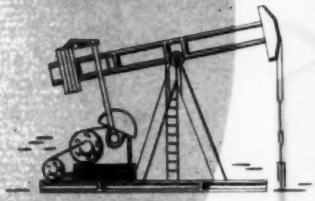
FB-495

Farrel-Birmingham

You Buy with Assurance at BOVAIRD

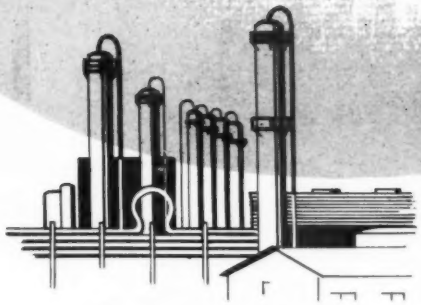
SUPPLY BOVAIRD COMPANY

DRILLING



PRODUCING

PIPELINE



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OFFICES AND STORES

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KANSAS—Chase, McPherson, Pratt, Russell, Wichita
OKLAHOMA—Duncan, Oklahoma City, Pauls Valley, Sapulpa, Seminole
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The complete stocks maintained by Bovaird Stores mean that your inventories may be kept to a minimum. Bovaird endeavors to have on hand the equipment and supplies you need — when you need them.

You'll find the personnel in every Bovaird Store alert, capable and eager to efficiently analyze your needs and help you select your requirements.

"Buy From Bovaird"

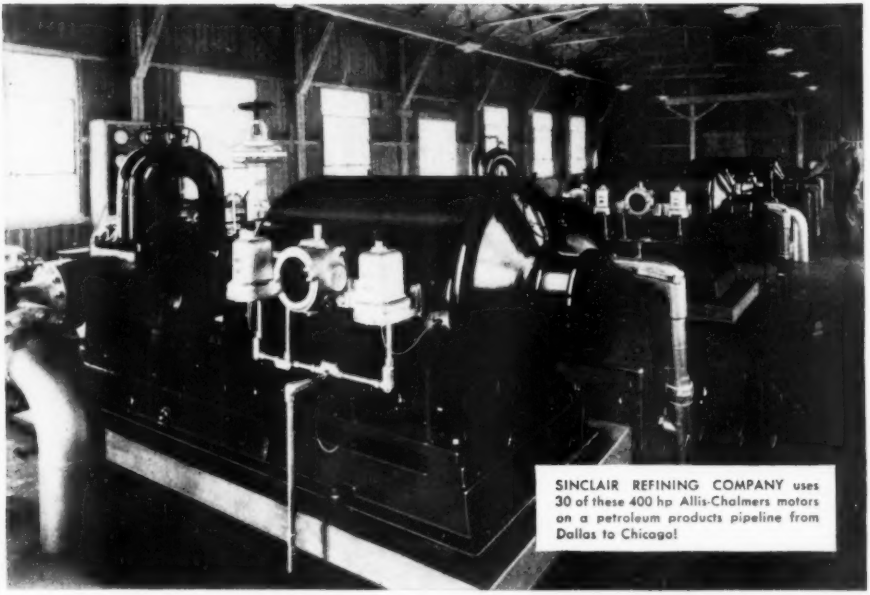
THE BOVAIRD SUPPLY CO.

GENERAL OFFICES: TULSA, OKLAHOMA

Underwriters' Laboratories INSPECTED MOTOR FOR HAZARDOUS LOCATION ELEC 10152 CLASS I GROUP D NO. L

EXPLOSION-PROOF MOTORS TO 450 HP!

Higher Ratings In Similar Design



SINCLAIR REFINING COMPANY uses 30 of these 400 hp Allis-Chalmers motors on a petroleum products pipeline from Dallas to Chicago!

OVER ONE THIRD of Allis-Chalmers tube-type, explosion-proof motors have been purchased by 18 of the world's leading petroleum companies! . . . Proof that petroleum operators want these important features:

1. APPROVED BY UNDERWRITERS' LABORATORIES for ratings to *450 hp at 3600 rpm.* Motors of similar design are offered in larger sizes. This new, tube-type motor is the simplest explosion-proof design now offered in the very large sizes.

2. MOTOR IS SELF-CLEANING because of straight flow of cooling air — avoiding hidden recesses encountered in usual designs. If unusual operating conditions make cleaning desirable, motors can be cleaned while in operation — simple as cleaning your shotgun with a ramrod!

3. QUIET OPERATION because of improved fan design . . . straight flow of cooling air . . . smaller quantity of cooling air required by effective radiation system.

4. LIGHTER WEIGHT, YET MORE EFFICIENT! Elimination of heavy shell castings reduces motor weight . . . no sacrifice of electrical performance.

You'll want more information on how this *new* motor can help save maintenance dollars! Send for Bulletin 51R7149.

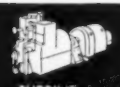
ALLIS-CHALMERS, 1059A SO. 70 ST.
MILWAUKEE, WIS.

Texrope is an Allis-Chalmers trademark.

ALLIS-CHALMERS

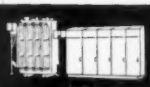
A-2760

Power, Electrical, Processing Equipment for Petroleum Industry


TURBINE-GENERATORS

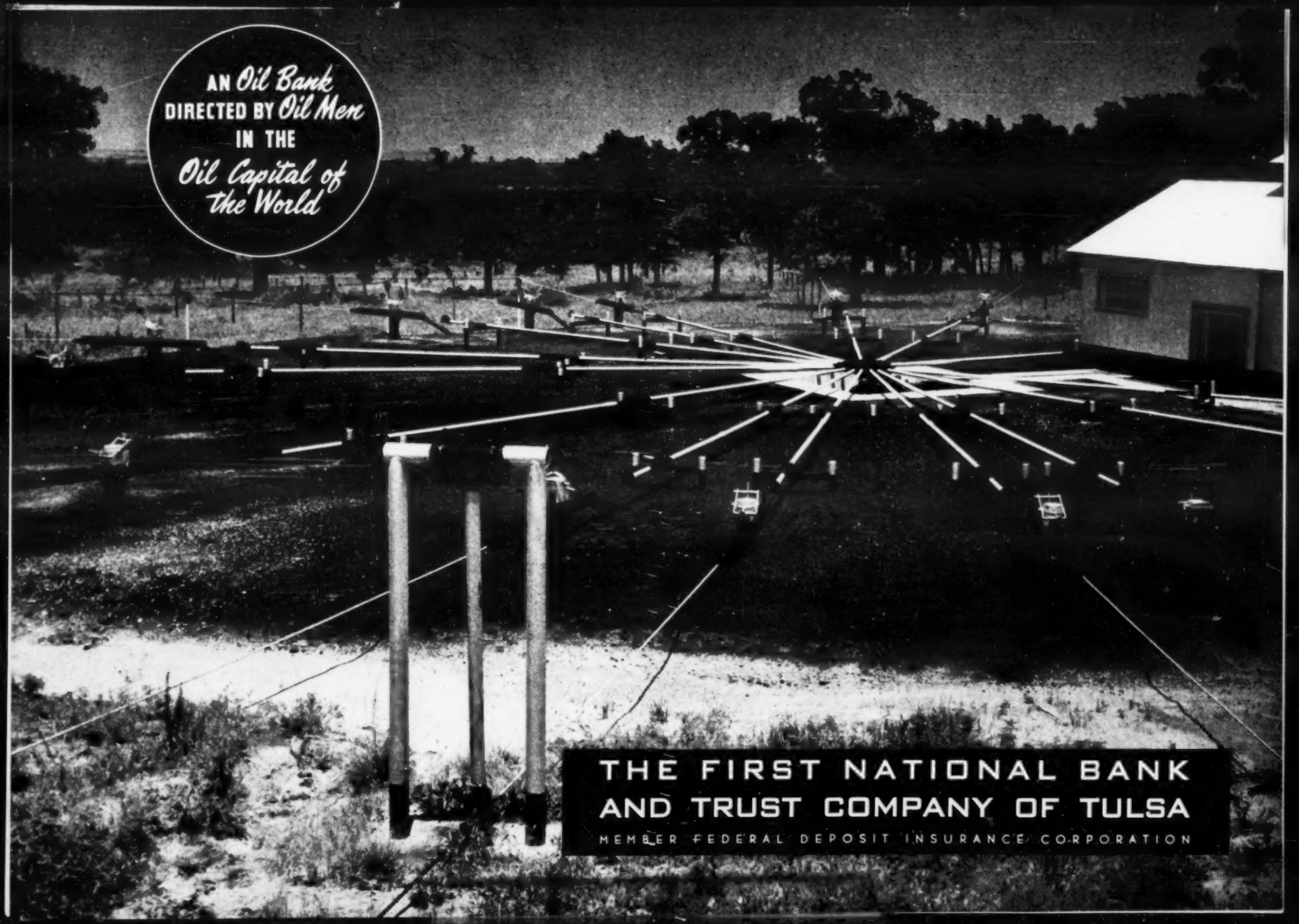
BLOWERS and COMPRESSORS

TRANS-FORMERS


UNIT SUBSTATIONS

MOTORS—*TEXROPE* DRIVES-CONTROL

CENTRIFUGAL PUMPS


AN Oil Bank
DIRECTED BY Oil Men
IN THE
Oil Capital of the World
THE FIRST NATIONAL BANK
AND TRUST COMPANY OF TULSA
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

IMPROVE YOUR EMPLOYEE RELATIONS WITH THIS FIVE-STEP PROGRAM!

Of the nation's 33,000 companies employing 100 or more people, over 20,000 firms are operating the Payroll Savings Plan—the popular system by which employees invest in U. S. Savings Bonds every payday. These companies report *internal benefits* from the Plan: reduced absenteeism, lower accident rate, increased production. Such results are, of course, manifestations of the sense of greater security the employees feel as their investment in Bonds grows. It naturally follows that employee-employer relations improve as well.

HOW TO GET THE MOST GOOD

Obviously each company benefits in proportion to the percentage of its employees who participate in the Plan. Nation-wide experience indicates that 50% of the employees in your company can be persuaded to participate *without high-pressure selling*. Here are five steps which have proved to be the "magic formula" for putting over the Plan. They will get results for you:

1. See that a top management man sponsors the Plan.

2. Secure the help of your employee organizations in promoting it.

3. Adequately use posters and leaflets and run stories and editorials in company publications to inform employees of the Plan's benefits to them.

4. Make a person-to-person canvass, once a year, to sign up participants.

These first four steps should win you 40-60% participation. Normal employee turnover necessitates one more step:

5. Urge each new employee, at the time he is hired, to sign up.

EVERYBODY BENEFITS!

7,500,000 workers are regularly buying an individual average of $20 of Savings Bonds per month. These people are gaining financial security—are putting more opportunity into their futures—because at maturity every $3 invested will pay $4.

Business and the national economy benefit too. Savings Bond dollars are deferred purchasing power—an assurance of good business during the years to come.

Check up on the Payroll Savings Plan in your company. If fewer than half of your employees are participating, you have a lot to gain by following the five-step program outlined here. All the help you need is available from your State Director, U. S. Treasury Department, Savings Bonds Division. While it's on your mind, why not call him right now? Or write the Treasury Department, Washington 25, D. C.

The Treasury Department acknowledges with appreciation the publication of this message by

THE OIL AND GAS JOURNAL
Tulsa 1, Oklahoma

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and the Advertising Council.

McEVOY Flange Protectors

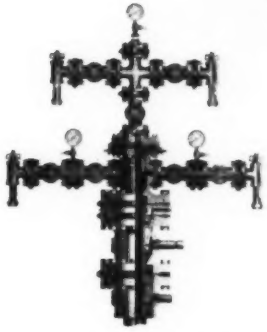
prevent corrosion of ring gaskets and studs between flanges...

McEvoy Flange Protectors eliminate corrosion of studs and ring gaskets from external causes such as salt water spray, hydrogen sulfide gas or similar corrosive gases or sprays.

Easy to install, the protectors are slipped around the flanges and tightened in place. Grease is then injected into the area between the flanges through Alemite fittings, and gaskets on the inside of the protectors prevent loss of grease.

McEvoy Flange Protectors are simple, reliable and low in cost. They pay for themselves many times over when installed on trees subject to external corrosive agents. Write for full details.

McEvoy Flange Protectors are made to fit any API flange series and size.



For greater safety and lower replacement costs on corrosive wells

McEvoy Flange Protectors are fully covered by patents . . . and are manufactured by McEvoy — exclusively.

Specify **McEVOY All-Stainless CHRISTMAS TREES and VALVES**

Sold through all leading supply stores.

McEvoy COMPANY

ASSOCIATION OF WELL HEAD EQUIPMENT MANUFACTURERS CERTIFIED

TEXAS AND MILBY ST. • P. O. BOX 3127 • HOUSTON 1, TEXAS

Export Representative: E. F. Gahan, Inc., Room 1223, 500 Fifth Avenue, New York, N. Y.

Spin-in

A STRONG JOINT...

WITH REPUBLIC *Electric Weld* CASING

Throw your spinning line around a joint of Republic Electric Weld Casing. Signal for the power and feel those clean, full-formed threads take hold . . . fast. You're spinning-in a joint that needs only a turn of the tongs to discourage any pull-out.

With this modern tubular product, pull-out protection starts in the casing wall. Made under the advanced Republic Electric Weld Process, those walls are uniformly thick, round and sound, free from trouble-inviting weak spots. When the husky threads are cut, plenty of tough steel remains under their roots all around the pipe. They're anchored in a solid, uniform layer of tough steel that won't give way under the load of long strings.

Yes, you'll spin-in a strong joint . . . and you'll get top resistance to collapse, too. Republic Electric Weld Casing is made only from high ductility steel, fully normalized for uniform structure and cold sized for high yield strength. Specify it for complete dependability.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic Electric Weld Casing and Tubing are made from flat-rolled steel, both sides of which are inspected. Thus, the surface which becomes the inside wall is free from hidden defects.

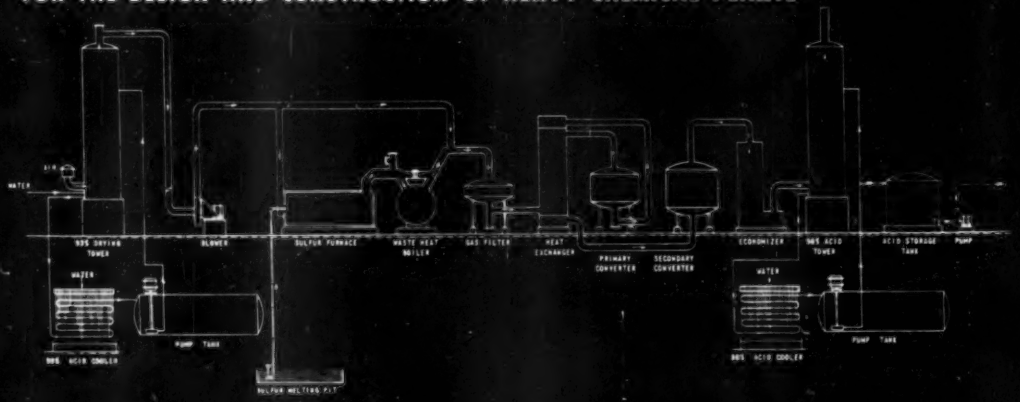
REPUBLIC *Electric Weld*
NORMALIZED CASING AND TUBING

REPUBLIC STEEL

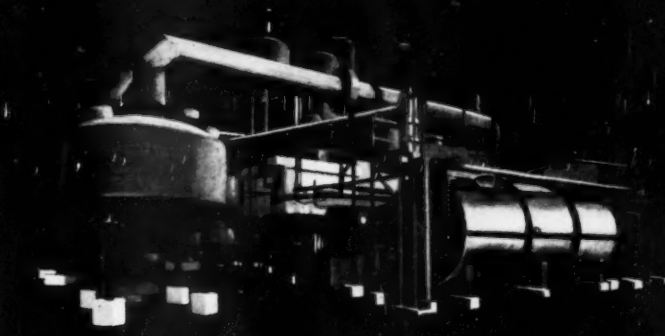
Other Republic Products include Line Pipe—Carbon, Alloy and Stainless Steels—Upson Studs, Bolts and Nuts—Electrunite Heat Exchanger Tubes

from plan to plant

CHEMICO'S ALL-INCLUSIVE SERVICE OFFERS IMPORTANT ADVANTAGES FOR THE DESIGN AND CONSTRUCTION OF HEAVY CHEMICAL PLANTS



FLOW DIAGRAM
TYPICAL CHEMICO CONTACT
SULFURIC ACID PLANT



Here are the broad, **start-to-finish** *steps Chemico takes to make certain that every plant they build will be a* **profitable investment.**

INITIAL INVESTIGATION — Each Chemico project is specifically planned to meet individual needs. Before engineering designs are started, Chemico checks type of available utilities, elevation of plant site, soil conditions . . . in fact, every factor that might influence the design of the plant.

PROVED PROCESSES — Chemico has pioneered in the development of improved processes that help increase production quality and quantity. Chemico will either adapt these advanced, plant-proved processes to your particular problem . . . or, in some cases, develop entirely new processes.

MAN-HOUR MATHEMATICS—Carefully calculated, too, are the means to make every man-hour most productive . . . and to reduce over-all manpower requirements through automatic operation, centralized control and efficient plant layout.

MINIMUM MAINTENANCE — The process used, the selection of equipment, the plant layout—all are analyzed with an eye to simplifying maintenance problems. In a Chemico-built plant, repairs are never "hard to get at".

COMPLETING THE CONTRACT — Chemico makes certain that over-all guarantees are met before turning over the plant to the purchaser. And Chemico trains the operating crew to assure smooth-running, efficient operation.

These add up to *one contract—one responsibility.* During the past 35 years, Chemico has built hundreds of heavy chemical plants throughout the world. That's proof of Chemico's successful experience.

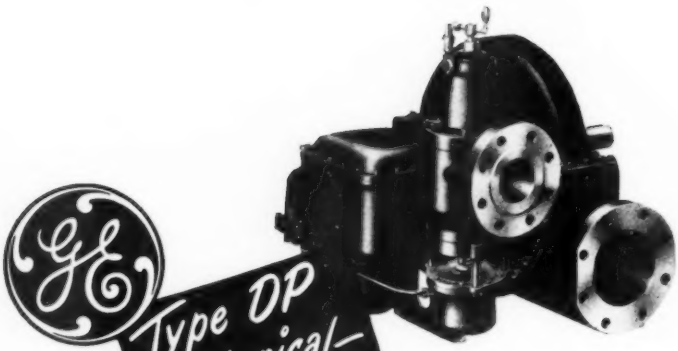
CHEMICAL CONSTRUCTION CORPORATION

EMPIRE STATE BLDG., 350 FIFTH AVENUE, NEW YORK 1, N. Y.

EUROPEAN TECHNICAL REPRESENTATIVE
CYANAMID PRODUCTS, LTD., BERTLENHAM HOUSE, LANCASTER PLACE, LONDON W. C. 2, ENGLAND
CABLES: CHEMICONST, NEW YORK

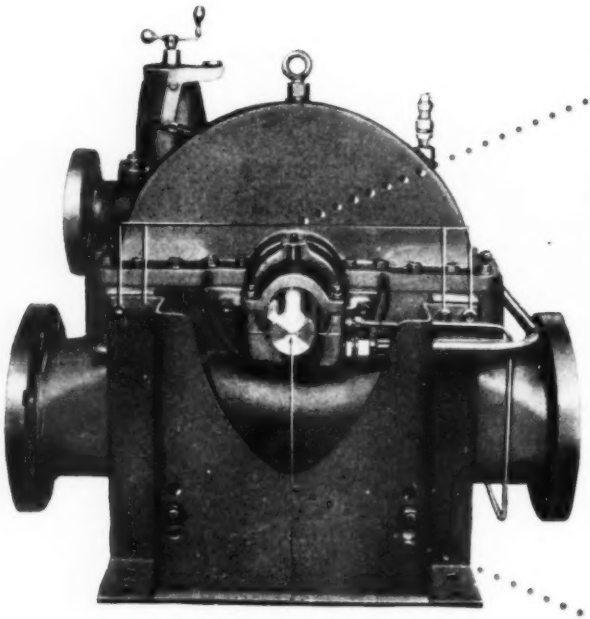
Chemico Plants are Profitable Investments

CC 179



Type DP Mechanical-Drive Turbine

SAVE TIME ON



Turbines supported at the centerline save many mis-alignment headaches both during and after installation. In general, this method of support cuts down shaft "lift" from casing heating to less than a quarter of the lift of foot-supported units.

Thus, unless casing temperatures are high, G-E standard turbines can be lined up cold with the assurance that shaft lift will be within allowable limits when the turbines are heated. No calculations or adjustments for setting the shaft low when cold will be required.

With the unit in line hot or cold, shaft whipping, which often causes bearing burn-outs, excessive vibration, and coupling wear, is eliminated.

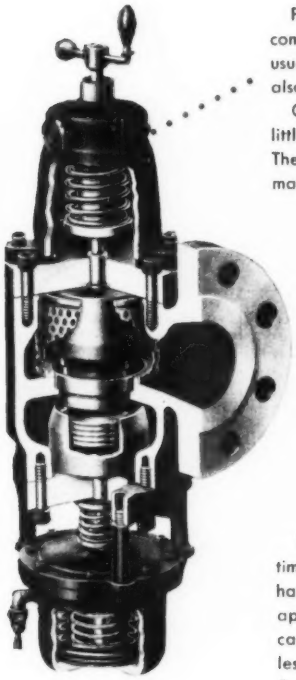
You save time when coupling the turbine to the driven unit, since the shaft height is identical on all G-E standard turbines. Not only that, but shaft diameter, keyway dimensions, etc., are identical on all turbine frame sizes. This standardization saves lost motion when installing or re-locating turbine drives.

INSTALLATION!

WITH GENERAL ELECTRIC STANDARD TURBINES

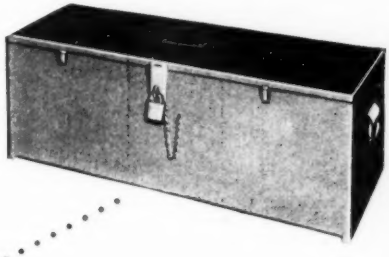
SAVING time when installing or re-locating turbines is one of the important advantages of using G-E standard turbines. Many other advantages: wider range governing, pressure lubrication, fewer wearing parts, are also standard with the Type DP —at no extra cost.

If you are planning installation of turbines, check with your G-E representative. He'll gladly give you application assistance and complete data. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*



Piping is simplified with G-E standard turbines. The combined trip-throttle valve—an exclusive G-E feature—usually makes a separate shut-off valve unnecessary. This also saves the cost of an extra valve.

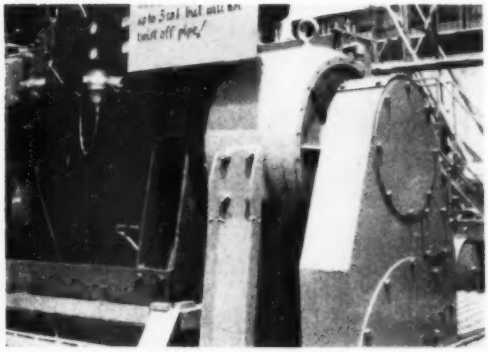
Once installed, the combined trip-throttle valve requires little maintenance. There are no soft packings to replace. The steam strainer in the valve assembly is easily removed, made of Monel metal to resist corrosion.



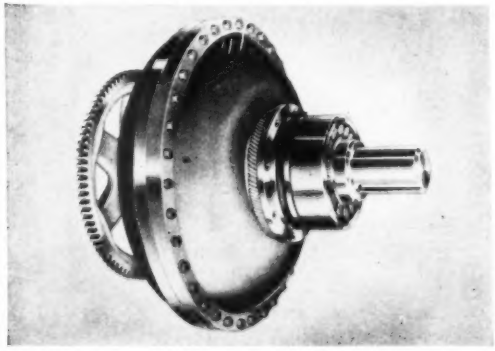
With a new installation there's no need for you to spend time selecting spare parts it may be desirable to have on hand. This standard set of packaged spares contains parts applicable to DP turbines of all ratings. One set of spares can thus service several turbines. The price is very low—less than 25% of the price of a comparable set of spares for previous designs—thanks to standardization.

GENERAL ELECTRIC

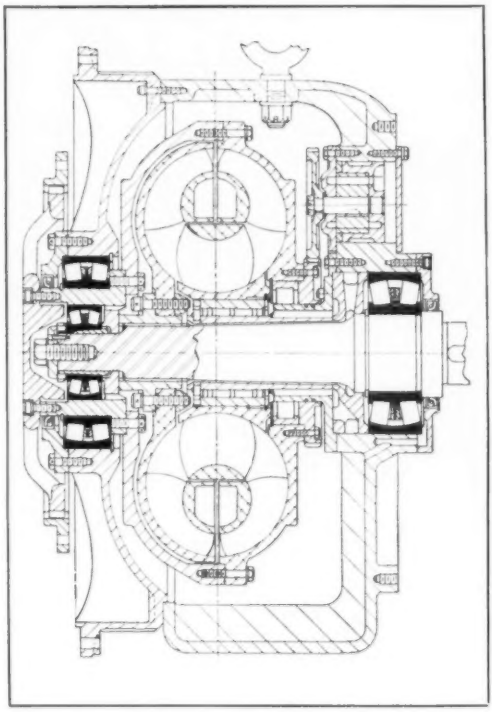
Torrington Spherical Roller Bearings Operate Freely Under Deflection in TORCON Torque Converters



An efficient transmission for a rotary table drive, above, or for other oil field and industrial machinery, the Torcon is a hydraulic torque converter and coupling in one. For smooth, trouble-free operation, it is equipped with Torrington Spherical Roller Bearings.



No detail that might increase the efficiency and reliability of the Torcon (Schneider System) has been omitted by Torcon Corporation, Chagrin Falls, Ohio. That's why high-capacity Spherical Roller Bearings are used on the input and output shafts.



One problem solved by the use of Spherical Roller Bearings is deflection of the output shaft, caused by overhung sprocket loads. The application of self-aligning bearings, shown in cross-section, permits the use of a right angle chain drive, without an outboard bearing. Long service life is assured by the high capacity and smooth operation of Torrington Spherical Roller Bearings.

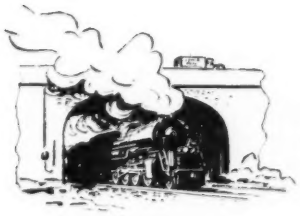
Design for greater efficiency, longer service life and lower maintenance costs with Torrington Spherical Roller Bearings. Our engineers will be glad to help you. Write us today. THE TORRINGTON COMPANY, South Bend 21, Ind., or Torrington, Conn. District offices and distributors in principal cities of United States and Canada.

TORRINGTON SPHERICAL ROLLER **BEARINGS**

Spherical Roller • Tapered Roller • Straight Roller

Needle • Ball • Needle Rollers

22 Ways to Stop Using 2 Where 1 Will Do!



How An Electrical Equipment Manufacturing Company Put Monel Fastenings to Work

When power lines and steam locomotives *both* go under a viaduct, you meet a nice problem in corrosion. The fiery blast from the iron horse quickly ruins ordinary conduit fastenings. But one company we know solved the problem with Monel. They used ¾" Monel bolts, 27" long. That conduit is going to stay put for a long time.

WHEN TOUGH JOBS DEMAND TOUGHER FASTENINGS ... YOU'LL NEED FEWER REPLACEMENTS WITH MONEL

On some jobs, ordinary fastenings can be used with no worries.

But important jobs need extra protection against corrosion ... rust ... overstressing ... shock ... vibration ... heat ... cold.

For those jobs you need dependable fastenings, *Monel*® fastenings.

Monel gives you all the "extras" that mean life in tough spots.

For example, Monel resists corrosion by most acids, alkalies and salts.

You get superior mechanical properties, too. Compare Monel with the free-cutting steel used in ordinary fastenings, and you find Monel is 20% stronger ... 30% more ductile ... 40% tougher.

Maybe your problem is extreme temperature. Again, Monel is your answer. For Monel fastenings retain their strength at elevated temperatures or at the coldness of liquid air.

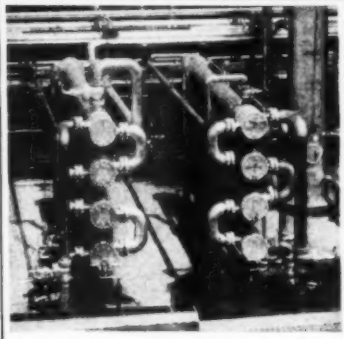
How many places in your plant or product do you want *(and need)* the extra advantages of Monel fastenings? Remember, *any* fastening you need is available in longer-lasting Monel.

TEST A MONEL FASTENING, FREE! Write to Bob Johnson of Inco. Tell him your problem and the type and size you need. He'll send a sample ... plus the address of your nearest supplier.

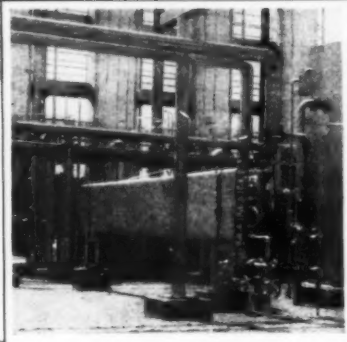
EMBLEM OF SERVICE INCO

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

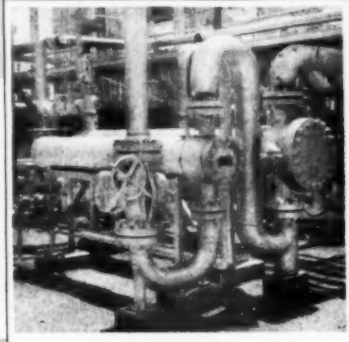
Monel® Fastenings are stronger..tougher..safer



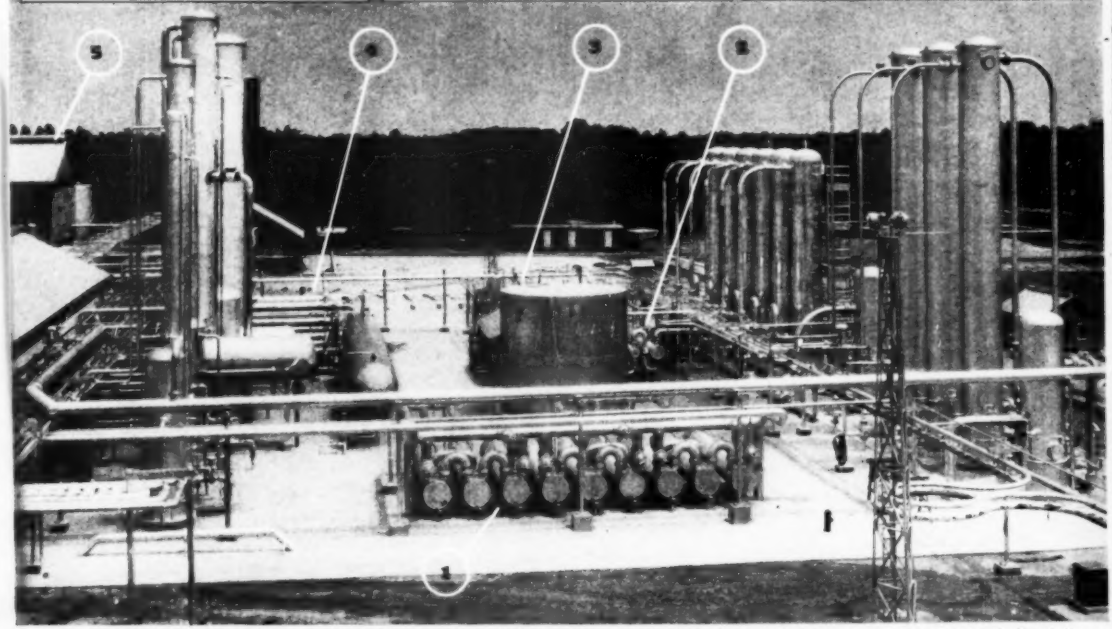
4. G-R Tubular Still Feed Exchangers and Preheaters



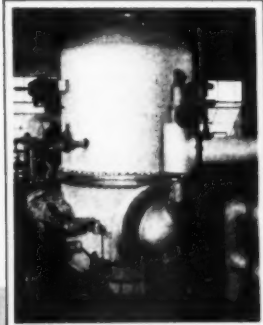
3. G-R Twin Bare Pipe Section Boiler Feedwater Exchangers



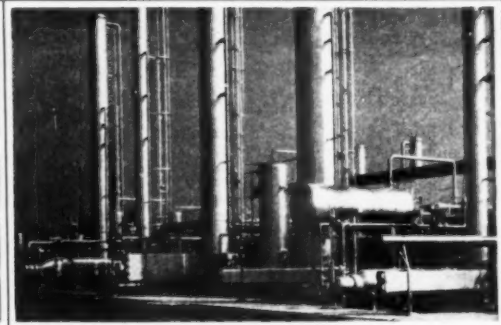
2. G-R Tubular High-Pressure Gas Heaters for regeneration of dehydrating material



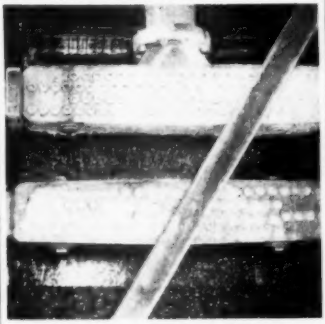
1. General view of portion of the Feasel and Kinsey Plant of Chicago Corp., at Carthage, Texas, showing a row of nine G-R Tubular Units used as main exchangers in the foreground



5. G-R Bentube Evaporator for distilling the feedwater make-up for the high-pressure boiler plant



G-R Kettle Type Reboilers and G-R Twin G-Fin Section Fractionator Column Feed to Product Exchangers



Two of more than 60 G-R Atmospheric Bentube Sections for all cooling services, including extremely high-pressure gas cooling

GRISCOM-RUSSELL: PIONEERS IN HEAT TRANSFER APPARATUS

G-R

Heat Transfer Apparatus

again used in this

Chicago Corporation Plant

The Chicago Corporation has had lengthy experience with G-R Heat Exchangers . . . they have successively installed many G-R units of various types at their Wardner, Coastal and Gulf Plains Recycling Plants.

The excellent performance of these previous G-R installations has justified their continued use of G-R Heat Transfer Apparatus throughout the new Chicago plant at Carthage, Texas. Here, as shown in the illustrations, a total of more than 100 G-R units of the following types have been installed:

Atmospheric Bentube Sections
High-Pressure Gas Heaters
Tubular Exchangers
Kettle Type Reboilers
Twin G-Fin Sections
Twin Bare Pipe Sections
Bentube Evaporator

This installation indicates two significant points of importance to *every* user of heat transfer apparatus:

1. The many different types of G-R equipment . . . an exactly suitable design for every heat transfer requirement
2. The outstanding success of G-R installations . . . winning repeat orders and exclusive standardization on G-R equipment

Bulletins describing G-R apparatus for heat transfer services in which you are interested will be sent on request.

THE GRISCOM-RUSSELL CO.

285 MADISON AVENUE, NEW YORK 17, N. Y.

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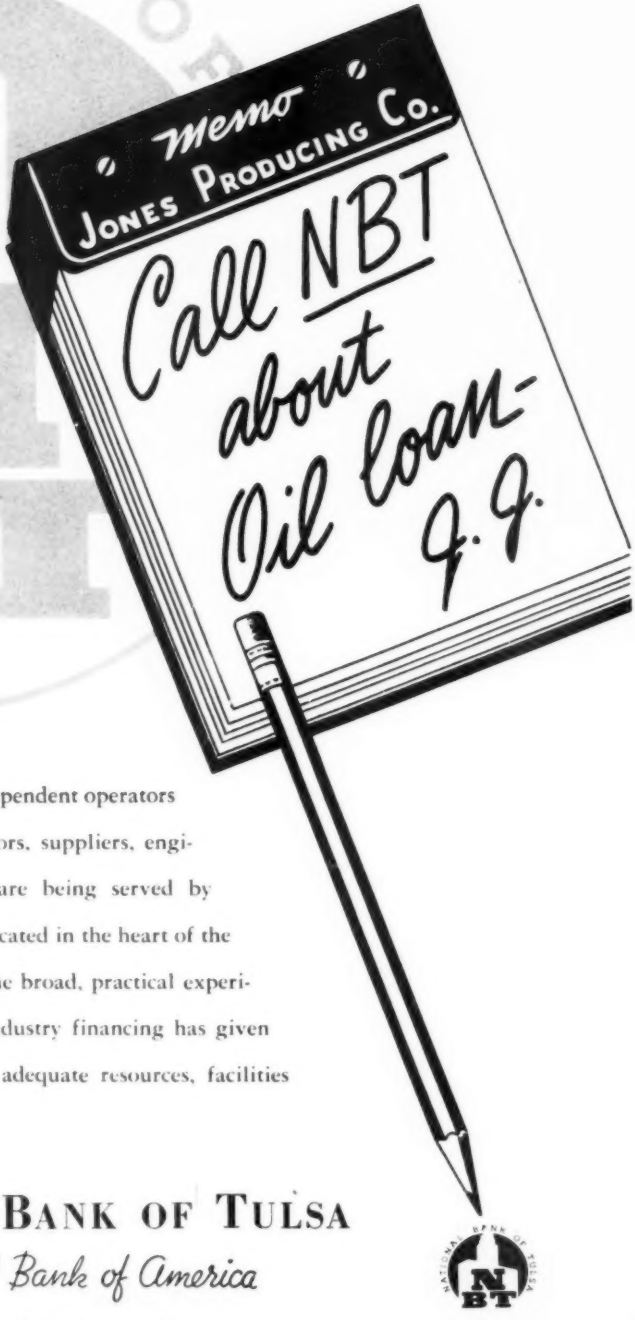
GRISCOM-RUSSELL



. . . A wise suggestion! Countless independent operators and producing companies, contractors, suppliers, engineering and exploration firms are being served by "The Oil Bank of America"—located in the heart of the great Mid-Continent area. The broad, practical experience of its officers in oil industry financing has given added significance to its adequate resources, facilities and services.

NATIONAL BANK OF TULSA

The Oil Bank of America

Member Federal Deposit Insurance Corporation

This Simple Compressor Meets the Complex Needs of a Changing Petroleum Industry

It's the Nash!

Here is a compressor presenting advantages found in no other device. Nash Compressors have only one moving part, rotating without metallic contact with the pump casing. No internal lubrication is required. Yet they produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure.

There are no valves, gears, pistons, sliding vanes, or other complicated wearing parts in a Nash. Compression is secured by an entirely different principle of operation. Because of this, gas pumping problems difficult with ordinary pumps are often easily handled by the Nash. For example, Nash Pumps are standard equipment in the Synthetic Rubber Industry, where they have met the needs of new and difficult processes.

Nash Compressors are compact and save space. They run without vibration, and compression is without pulsation. They maintain original performance over long periods. Service is assured by a nationwide net-work of Engineering Service offices. Instructive bulletin shows how they operate. Write for it.

One moving part.

No internal wearing parts.

No valves, pistons, or sliding vanes.

No internal lubrication.

Low maintenance.

Slugs of liquid entering pump do no harm.

Non-pulsating pressure.

Saves floor space.

75 pounds in a single stage.

NASH ENGINEERING COMPANY

273 WILSON, SO. NORWALK, CONN.

THEY REPL[illegible] EVERY [illegible]

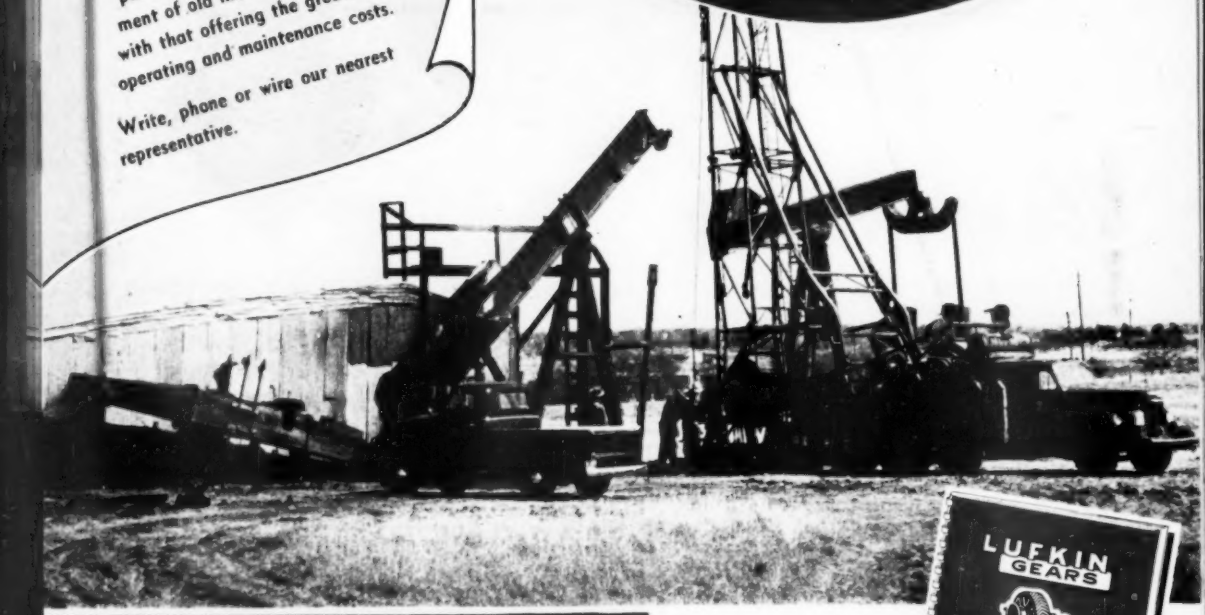
WITH TH[illegible]

Lufkin Line

Typical is this picture of the replacement of an old "Standard" rig with a modern, efficient, economical LUFKIN PUMPING UNIT.

In this day of "price slides" the demand for economy in all departments calls for the replacement of old inefficient equipment with that offering the greatest in operating and maintenance costs.

Write, phone or wire our nearest representative.



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LUFKIN, TEXAS

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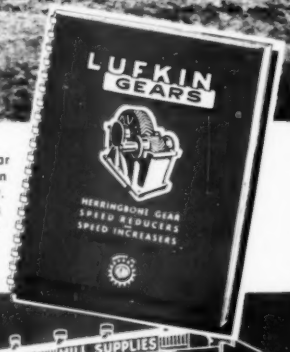
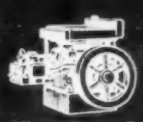
More than 60,000 complete gear reducers and increasers have been manufactured in our Lufkin plant. The complete line specifications are contained in Catalog G-1. Write for your copy today. No obligation whatsoever!



LUFKIN PUMPING UNITS



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LUFKIN OIL FIELD AND INDUSTRIAL TRUCK TRAILERS

INDUSTRIAL SPEED REDUCERS AND INCREASERS

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A geographically arranged survey of the active refineries in the United States, Canada and Mexico, showing their crude oil and cracked gasoline capacities and the type of products manufactured . . . plus a list of refineries that are now shut down.

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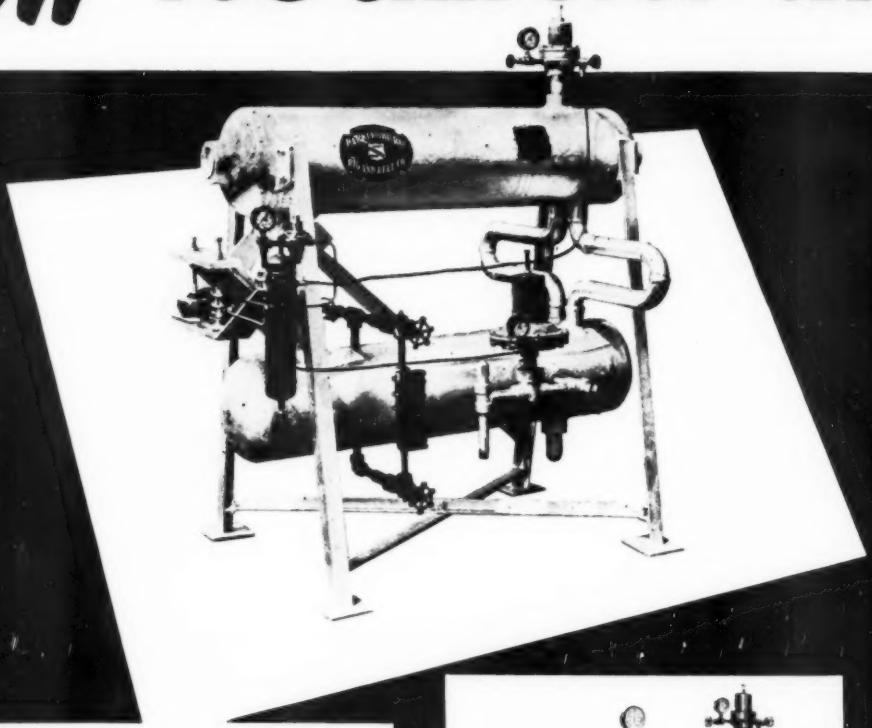
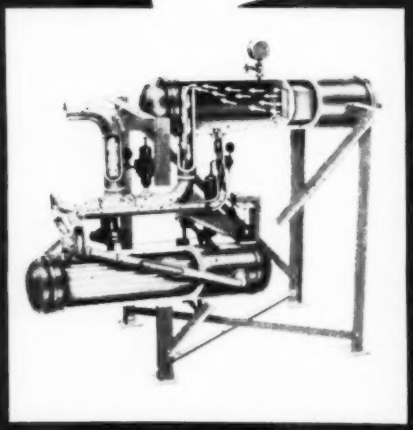
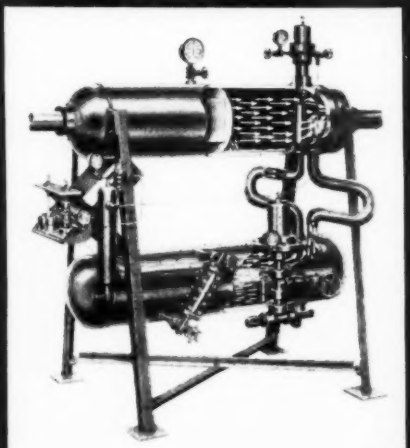




Type "W" HYDRACEPTER

for removal of water only.

This type permits all hydrocarbons, both liquid and gas, to flow on to the plant or separator. It is designed for use in lines supplying cycling or gasoline plants, or where scattered wells feed into a central separation or dehydration plant. This type will completely remove salt water from lines supplying gasoline and cycling plants.



Type "L" HYDRACEPTER

for removal of all liquids.

As a self-dumping line scrubber, this type removes any liquid accumulation from the gas lines. It can be installed at line level, eliminating the necessity of bringing the line out of the ground. Gas enters upper chamber at left and passes through scrubber. The water-laden condensate flows through one of the pipes connecting the settling chamber, where additional separation takes place. The water-free condensate returns through the other connecting pipe to the upper vessel, and then on down the gas line.

LINE FREEZING-COLD!

PARKERSBURG

HYDRACEPTER

(Patents Pending)

intercepts and removes free water . . . the cause of hydrate formation in gas lines.

Parkersburg HYDRACEPTER protects your line against freezing by intercepting and removing the cause of hydrate formation . . . free water . . . from the gas line at the point in the system where the maximum portion of produced water is in the liquid phase. And that should mean a lot to you with winter and costly, troublesome shut-downs, due to freezing, on the way.

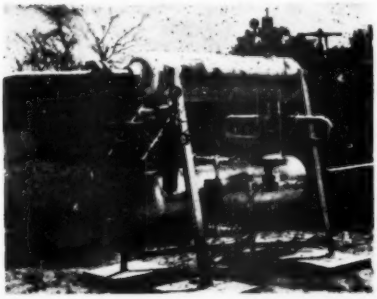
Basically, the Parkersburg Hydracepter is a small horizontal gas-liquid separator with a settling chamber for separation of water from the condensate so that only water-free condensate is carried down the line with the gas.

The Hydracepter has been engineered specifically for this job, with all controls developed especially for its requirements. The Hydracepter is easily and economically installed directly in the gas line and virtually becomes a part of the line.

The Parkersburg Hydracepter has no internal float. The settling chamber (lower vessel), acting as a weighting tank, performs the same functions as a float. With one end supported by the piping connecting the chamber to the separator, the other end rests some weight on the Strain Gauge Pilot. This pilot valve is set to open at some pre-determined weight, which determines the working liquid level or interface between the condensate and extracted water.

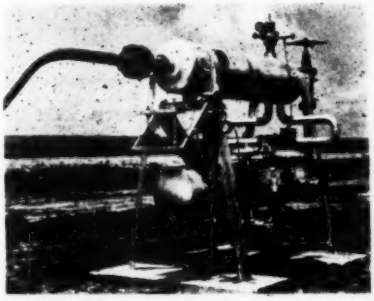
The Hydracepter is equipped with a Parkersburg Non-Freezing Pilot Supply Regulator to furnish a constant, trouble-free pilot supply of gas for the Strain Gauge Liquid Level Control Pilot.

Numerous installations and continuous field use have proved that even under severe conditions, Hydracepter prevents gas line freezing. Prepare now to keep your gas lines flowing all winter, by installing Parkersburg Hydracepter. Ask your nearest Parkersburg representative for details on this new and revolutionary oil field equipment, or write for Hydracepter bulletin HY-549.



LEFT: Hydracepter in gas supply line for the drilling rig provides a constant fuel supply . . also insures against slugs of liquid getting into the boiler fuel.

RIGHT: Hydracepter installed in the gathering system insures delivery of liquid-free gas to the sales line.



THE PARKERSBURG RIG & REEL CO.

PARKERSBURG, WEST VIRGINIA

No. 4908

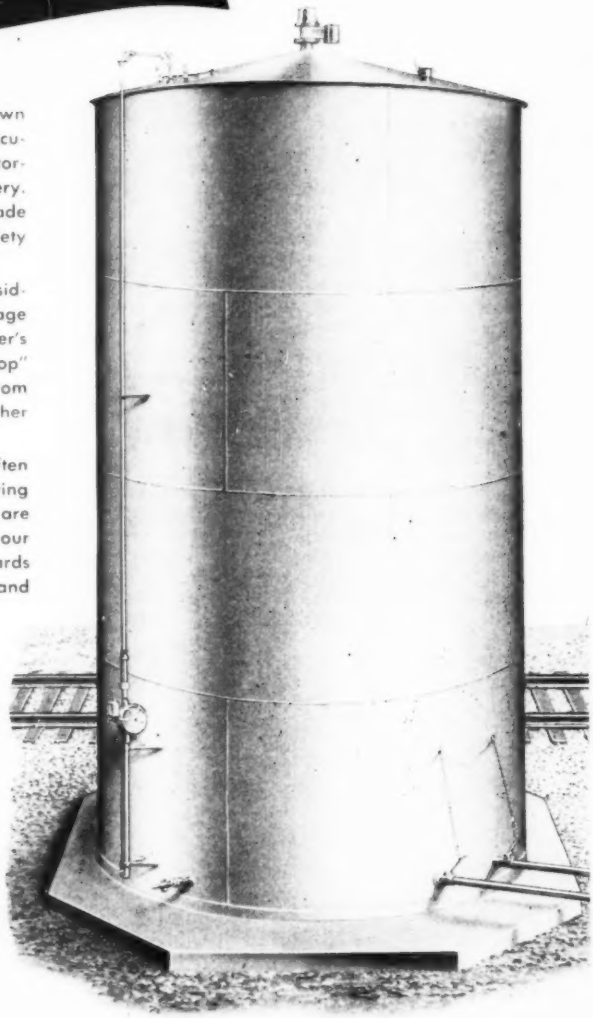
PARKERSBURG

DEPOT STORAGE TANKS *Deserve* S & J Fittings

Most of the major refiners who market their own products are just as concerned about safety, accuracy, economy and conservation at their depot storage installations as they are at their home refinery. They equip these tanks with the same high grade S. & J. fittings to obtain the same degree of safety and economy that they demand at the refinery.

Yet, across this great land are thousands of rail sidings in small towns and villages, with depot storage tanks whose fittings are not a credit to any engineer's judgment. Gasoline vapors—"the cream of the crop"—are dissipated to the thin blue air. Shrinkage from evaporation is tremendous. Tank gauging is neither safe nor accurate. Liquid transfer is dangerous.

Shand & Jurs fittings for depot storage tanks often save their cost in less than a year, just by eliminating vapor losses. It makes no difference whether you are a big corporation or an independent operator—your depot storage tanks are subject to the same hazards and the same losses—they deserve S. & J. safety and conservation fittings.



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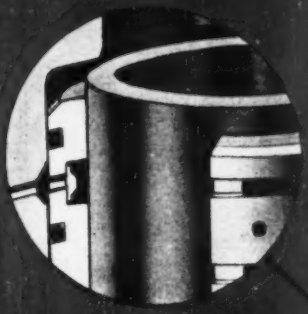
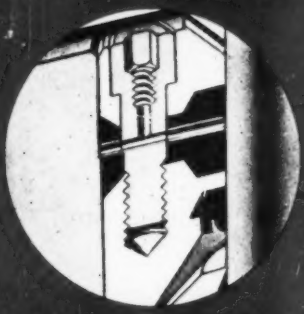
The CAMERON Type "NTXM" Forged Steel Casing Head

TRIPLE-SEALED AND DOUBLE-TESTED

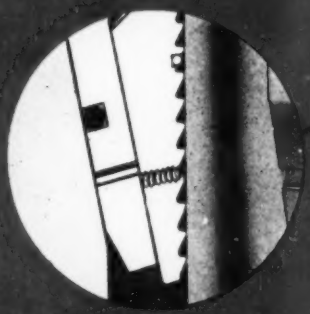
for maximum safety on deep, high pressure wells



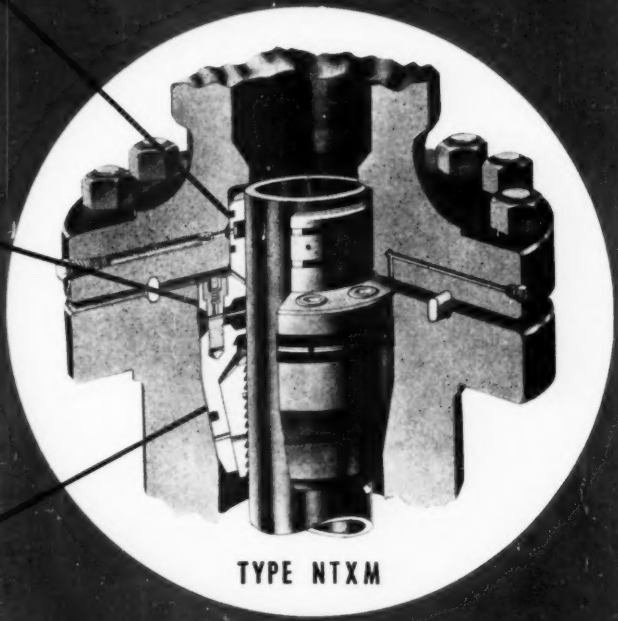
Externally removable, pressure-energized plastic seal on crossover gland.



Pre-tested, resilient seal above slips.



Type "N" slips, with seal ring on slip bowl and lip seal above slips, for temporary but instant seal when setting thru production.



TYPE NTXM

Pictured above, is one of many possible interchangeable hanger and seal assemblies for Cameron Forged Steel Casing Heads. This particular assembly combines several proven Cameron casing seals, including the Type "N" seal preparation which has been so widely used in the Cameron Type "N" Test-Weld Flange. This seal may be pressure-tested and repacked at any time during drilling or after the well is completed without disturbing the well head assembly.

The primary service seal is accomplished by tightening cap screws to expand a resilient seal ring. It may be tested by introducing pressure thru one of the cap screws in which a test port is provided.

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JOURNALLY Speaking

Picture Supplement

DON'T toss away the picture sheet folded into this issue. It contains a lot of important dope about what happens to oil between the well head and the refinery gate.

Time was when about the only thing between these points in addition to the pipe line was the lease tank and maybe a simple gas separator. Now a lot of petroleum goes through some pretty fancy treating before it gets to the refinery proper, and this insert sheet pictures some of the typical installations.

This isn't exactly new, of course, as our engineering editors point out by printing on the reverse side of the sheet a list of some of the articles they have written on the subject. But they thought it would be a good idea to dramatize this trend by gathering a lot of pictures you might want to hang on your wall.

Many people, it is feared, think of the producing and refining divisions as two entirely different industries without much in common with each other, so our brains department undertook to set them straight by picturing some of the refinery-like apparatus used in field processing.

Refinery Hay

ASSOCIATE EDITOR R. B. TUTTLE cut his teeth on refinery equipment, and when he goes through a refinery he can usually explain things to the superintendent. But the other day he was stopped cold.

Worming his way through a construction gang putting up a large new unit, and taking notes for a forthcoming article in our favorite oil publication, Tut ran into a big pile of baled hay. Yes, hay. There wasn't a horse, cow, or mule within miles, but there was the hay.

Tut scratched his head and pondered the problem. Insulation against freezing during construction work? The beating August sun ruled that one out. To soak up spilled oil or protect the grass, maybe? Tut dumped the sand out of his shoes and decided against that. Filtering material for some new process he never heard of? He gave up and asked the superintendent.

"Oh, that," said the sup. "Why, a lot of concrete buildings around here are being made of slabs cast flat on the ground and then hoisted into place with a crane, and before they put up a slab they polish the rough cement by pushing bales of hay around over it. Works fine, too. You could hold a dance on one of those slabs when they get through with that hay treatment."

Friendship

ONE of the brass around here asked Leigh McCaslin, who covers the Gulf Coast beat, how he managed to get the yarn in last week's issue about laying the first offshore pipe line.

Combination of friendship and fast footwork, Mac replied.

A Houston friend just back from Louisiana, he says, tipped him off that the line was to be laid in a few days, so Mac phoned a friend in The California Co. who made the necessary arrangements for him to fly out to the site. Anticipating some delay in getting his article approved, Mac wrote it on the spot and had the technical men o.k. it for facts. Then back in New Orleans Mac bought a lunch for another friend, a man well up in the company's front office, and this friend got final approval in short order.

Mac's explanation may have been slanted toward the biz office as justification for expense accounts on previous trips over New Orleans way, but it demonstrated the value of having friends in the right places.

Count Your Blessings

THE automobile industry is joyously bragging that its production of vehicles during June nearly equaled the peak production in its history, which was a month in early 1929. The oil industry is downhearted because its current rate of activity is only a little more than double what it was in 1929. Optimism must be a matter of relativity.

—*Henry D. Ralph*

How OIL-WELL CEMENT TESTS HELP THE OIL MAN

NOTHING takes the place of first-hand oil-field know-how. But laboratory-test results give the practical oil man another good tool to work with. Although no two wells are exactly alike, cement slurries are up against certain conditions common in all wells—and these conditions can be re-created in the laboratory. The value of the resulting test information rests squarely on three things:

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the OIL AND GAS JOURNAL

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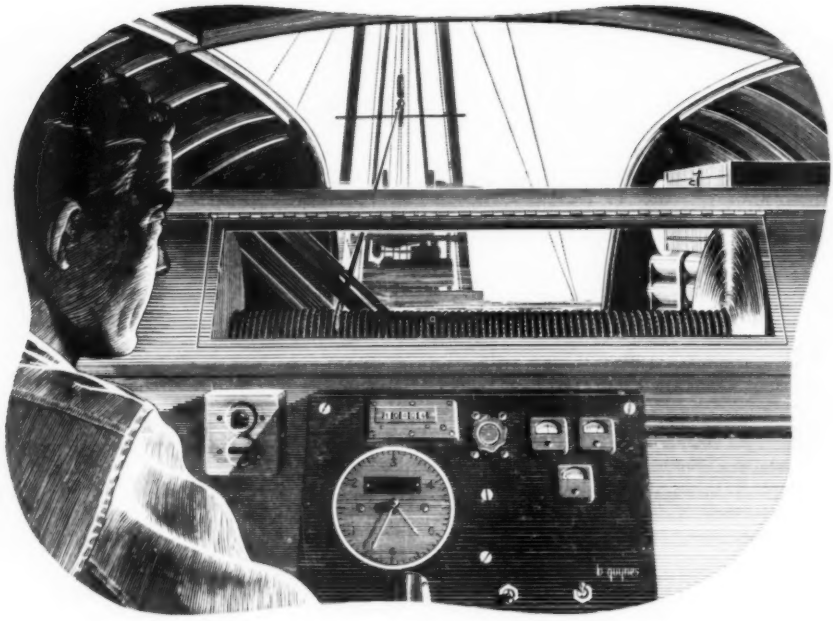

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_____this week

INDUSTRY—New firm, Delta Gulf Drilling Co., buys properties of J. C. Hawkins, Dallas, for a reported $15,000,000. . . . ¶Sterling Oil & Refining Co. acquires all properties of Coast Co., drilling and producing subsidiary of Tennessee Gas Transmission Co. . . . ¶Independent operators object to pending legislation which would provide for competitive bidding for all leases on acquired government lands.

INTERNATIONAL—E. W. Pauley sells large part of his one-third interest in Mexican-American Independent Oil Co. to American Independent Oil Co. for reported $200,000. . . . Pauley reported planning to become president of new Mexican oil-exploration company. . . . ¶Bilateral treaties urged as protection for American investments abroad. . . . ¶Oil seen as principal subject of discussion between British and United States officials in Washington next month. . . . ¶Richmond Exploration Co. curtails drilling program in Venezuela, postpones indefinitely plans for construction of 35,000-bbl. refinery in Maracaibo area. . . . ¶Rotary rigs now operating outside United States and Canada total 424, a drop of 33 since March. . . .

GOVERNMENT—Bureau of Mines forecasts record fourth-quarter demand of 6,772,000 bbl. daily. . . . Figure would bring year's average to 6,225,000 bbl. daily, a 1.6 per cent gain over 1948. . . . ¶State Department report says there is "little or no basis" for view that imports are primarily responsible for U. S. production cutbacks. . . . Report says reduction in net imports has been "as great or greater than" decline in domestic production. . . . ¶Question of tidelands legislation confused as Senator O'Mahoney opposes compromise bill drawn up by federal and state officials. . . .

TRENDS—For the latest 4-week period, stocks of crude and major products decreased at the rate of about 100,000 bbl. daily. . . . In the same period last year, stocks were increasing at the rate 390,000 bbl. daily. . . . ¶Crude production for the same period was 790,000 bbl. daily less in 1949 than in 1948 but crude imports were higher by about 50,000 bbl. daily. . . . ¶Major supplier advances Gulf Coast distillate price, reflecting improved distillate markets in Gulf and East Coast areas. . . . Refiners are expecting further gains in distillate sales before the end of the month. . . .

REFINING—Strike at Pennzoil Co. refinery near Oil City, Pa., ends. . . . ¶Phillips Petroleum Co.'s diisopropyl alkylate plant near Borger, Tex., to resume operations. . . . ¶Plans announced for ammonia plant to be built at Yazoo City, Miss., for Mississippi Chemical Corp. . . . ¶Shell opens new wax plant at Houston refinery. . . .

PIPE LINES—Great Lakes Pipe Line Co. releases details on construction of proposed $37,500,000 expansion program, including 931-mile, 12-in. line from Oklahoma to Minneapolis. . . . ¶Coal and railroad interests ask courts to halt construction of natural-gas pipe line designed to supply Oak Ridge, Tenn., atomic-energy plant. . . . ¶Congressman indicates possibility El Paso Natural Gas Co. might ask for rehearing before FPC on application to construct natural-gas line from San Juan basin to California. . . .

NATURAL GASOLINE—Construction well under way on new 25,000,000 cu. ft. daily gasoline plant in Chesterville, Tex., area near Houston. . . . ¶Six producers began preliminary work on new $6,000,000 natural-gasoline plant in Andrews County, Texas. . . .

NATURAL GAS—Ohio Fuel Gas Co. seeking one of largest rate increases ever proposed to Federal Power Commission. . . . Claims excessive costs of operation make increased revenue necessary. . . . ¶FPC gives approval for expansion of Michigan-Wisconsin project. . . .

The "Toughest Inch" is what H. C. Price Co. calls this 26-in. gas pipe line it is laying for 200 miles over the mountains of West Virginia and Virginia for Atlantic Seaboard Corp. and Virginia Gas Transmission Corp. This picture gives an idea of the rocks, hills, woods, and streams which make the region so scenic and pipe lining so difficult

U. S., British Officials to Delve Into International Oil Problems

WASHINGTON.—The international oil situation will be one of a number of subjects scheduled for discussion at meetings of British and United States officials in Washington next month.

The occasion for the talks will be the visit of Prime Minister Clement Atlee and other members of the British labor government who are coming here to review England's financial position and attempt to work out a program of stabilization. That program, it has been reported, may involve a long-term multi-billion dollar loan.

Officials are confident there will be no "pact" or other formal agreement, believing rather than an effort will be made to reach an understanding of the relative fields of United States and British oil companies in the international field.

Marketing Fields to Be Studied

State Department officials have long been concerned over the inroads on American oil markets which the British companies have made, generally as a result of a shortage of dollar exchange in countries which in the past have normally been American markets.

Three important markets have switched to British oil so far—Egypt, Sweden, and Argentina—and conditions in Norway indicate that she, too, may be forced to go to sterling oil because of her dollar situation.

There are indications that unless conditions improve, other countries may be forced out of the dollar oil market and into the sterling area, and next month's talks will probably explore this situation deeply with a view to working out some sort of an arrangement slowing down the expansion of British oil world trade.

London reports are now mentioning the possibility of setting up a common oil policy for the two countries. It was pointed out that one British answer to the entire problem might be to form a world wide cartel of British and United States to regulate production, fix prices, and allocate markets.

Would Meet Opposition

Such a proposal would be certain to encounter opposition in the United States. It recalls the Anglo-American oil agreement which was fought by United States independent oil interests and never ratified in the Senate.

What is of major concern to the British is the possibility that dollar-produced oil, such as that from Saudi Arabia, may be displaced from some of its normal markets by sterling production, and that consequently this dollar oil will invade other markets where the British are now selling for dollars. It is held a disagreeable competitive situtation would result. Sales of British produced oil are now an important source of dollar income for that country.

British, Dutch, and American representatives held a series of meetings on the subject of oil last month in Washington. It is understood little was accomplished other than to examine and reach agreement on a statistical basis for further discussions. The French, while not participating directly, were kept informed.

Originally these intergovernment talks appeared to be dealing mainly with the level of European oil expansion, particularly refining. There are indications the Economic Cooperation Administration has set an over-all figure of 42,000,000 tons a year as the maximum level of build-up in capacity it will approve.

The complicated subject involves such ramifications as available refinery capacity outside Europe, expansion of crude production to meet refining needs, and the position of semiobsolete plants in Europe having sufficient capacity but requiring modern equipment.

Bilateral Treaties Urged as Means of Protecting Oil Investments Abroad

WASHINGTON.—Government guarantees of investments abroad by American nationals, called for in Point Four of President Truman's inaugural address last January, must be backed up by bilateral treaties with foreign governments protecting those investments from expropriation and other obstacles, the Senate banking committee was told last week by high government officials.

The committee has before it legislation which would permit the Export-Import Bank to guarantee such investments against risks other than those ordinarily encountered in business operations, such as the inability to convert earnings in foreign currency into dollars, expropriation without prompt and adequate compensation, and physical destruction of property incident to international war. Initially, it is expected the guaranties would be applied against the nonconvertibility of local currencies and would be extended later to cover other risks if the situation warranted.

Obstacles Outlined

The four greatest obstacles now confronting oil companies and other American investors in the underdeveloped countries which the President's program seeks to aid were listed by Secretary of the Treasury John W. Snyder as follows:

"1. The antiforeign sentiment generated by the regrettable experience of some foreign countries with investments from abroad:

"2. The growth of ideologies favoring state ownership and control of industry;

"3. The existence of political instability and extreme nationalism; and

"4. The prevalence of exchange controls stemming from economic difficulties."

Snyder's testimony was particularly pertinent to Latin America, where air-tight laws have made it impossible for United States oil companies to operate in many countries.

"Although we recognize the right of any country to institute necessary security measures," Snyder said, "foreign governments must recognize that the right to do business in their countries on reasonable terms, including the right to control and manage one's investment, is very important to our potential investors. Legislation in foreign countries requiring that local citizens shall hold a majority of the common stock will, in general, be a significant deterrent to prospective investors."

The right to convert income from investments into dollars and to transfer an appropriate share of the dollar proceeds to this country also is an important consideration, but one which could be dealt with by guaranties, the Secretary said.

However, Snyder added, "still another deterrent to the flow of American capital abroad is the tendency of some countries to nationalize some of their industries, including those belonging to foreign investors."

Compensation Essential

"The United States Government considers that the right to nationalize property within any country's borders is inherent in sovereignty but that the country resorting to the exercise of that right becomes subject to an equally strong obligation to make satisfactory compensation," he told the committee. "Foreign capital is not going to be invested freely and productively in countries where it will be in jeopardy. Accordingly, some acceptable means of com-

(Continued on page 196)

Imports Not Causing Cutbacks Here, State Department Says

WASHINGTON.—State Department officials last week expressed doubt that imports are causing or threatening any serious injury to the domestic producers, but the wartime chief of the exploration section of the Petroleum Administration for War warned that unless something is done to curtail imports this country may lose its next war.

The department's views were revealed in a "summary analysis" of the import situation submitted to Rep. Ed Gossett of Texas by Winthrop G. Brown, director of international trade policy, as a result of discussions between members of the Texas congressional delegation and department officials July 15.

Although he questioned whether imports were responsible for cutbacks in domestic allowables, Brown said the department still is "looking into the situation and is in contact with the principal oil importers with a view to assembling the data that are necessary to evaluate those companies' programs for future imports."

The department's report emphasized that foreign trade in oil has been an important factor in the development of the domestic petroleum industry, helping to solve the problem of balancing the pattern of product demand, and "by importing crude oil and less-highly refined products and exporting more-highly refined products, the domestic industry has performed a refining service of value not only to the United States but to other nations."

Relationship Changed

The report pointed out that although both imports and exports have normally been large in the past, the relationship between the two has undergone a substantial change in recent years, a change which resulted in the United States becoming a net oil importer in 1948 for the first time in many years.

However, it was held, while the aggregate figures are important as a measure of the total volume of our foreign oil trade, the net figures are the significant indicators of the volume of imported crude and products available for consumption in this country.

During 1948 the combined net imports of petroleum averaged 144,000 bbl. daily, or about 2.5 per cent of the domestic crude-oil output of 5,509,000 bbl. daily, the department said, but comparative figures for this year "do not support the claim that imports are displacing an increasing volume of domestic production."

"Instead," it was declared, "it is fairly clear that there has been a reduction in net imports fully as great or greater than the decline in United States crude output. Furthermore, net imports of 201,000 bbl. daily for May 1949 amounted to only about 30 per cent of the reduction in domestic output of nearly 700,000 bbl. daily for the same month. These relationships would seem to provide little or no basis for the view that imports are primarily responsible for the cutbacks in domestic production."

Domestic production expanded more rapidly than consumption during the past 2 years, and a readjustment was inevitable, sooner or later, the department argued.

Imports No Threat

"In spite of the limitations that have been established, oil production in the United States is currently about 40 per cent above the prewar level," the report said. "The current average price of crude oil in the United States is more than 110 per cent above the wartime OPA maximum, and has been exceeded in only 1 year (1920) since 1875. Furthermore, profits in the industry, although below the peak reached in 1948, are still at a high level. On the basis of the foregoing facts there would appear to be serious doubt that imports are causing or threatening serious injury to the domestic petroleum industry."

The warning that "the United States may lose World War III because of a lack of excess productive capacity of crude petroleum which must be developed in peacetime when labor and materials are more readily available" came from Carleton D. Speed, Jr., of Speed Oil Co., Houston, in a letter to Rep. Ken Regan of Texas.

Speed declared that the last war proved that naval reserves such as Elk Hills "have no value unless they are fully developed and connected to pipe lines which run to completed refineries capable of delivering ordnance materials required to prosecute a war."

And, he added, "the international cartels who owe allegiance to no flag used steel badly needed in this country to develop oil reserves that everyone knows Russia could take in a matter of hours and use against the United States in a third world war."

Speed said the Thomas amendment would prove a "partial solution" of the import problem, but contended that in reality the domestic producers should be permitted to furnish part of Europe's requirements—"at least that part that United States money is paying for."

Sterling Acquires All Coast Co. Properties

HOUSTON.—Sterling Oil & Refining Co. has acquired all properties of The Coast Co., Walter G. Sterling, president of the former concern, has announced.

Coast Co. was a wholly owned drilling and producing subsidiary of Tennessee Gas Transmission Co. It was formed in 1946. The Sterling company was organized in 1933 by the late Gov. R. S. Sterling. Both companies are headquartered in this city.

Operations of the Coast company were carried on in both the upper and lower Texas Gulf Coast and in South Louisiana. Sterling operates all along the Gulf Coast of Texas, but its primary interests are in Jackson, Brazoria, and Victoria counties. The company operates two of its own drilling rigs.

W. G. Sterling also announced the election of two new directors on the board of his company. They are R. G. Rice, a vice president of Tennessee Gas Transmission Co., and Robert K. Hanger, Fort Worth attorney who is also on the board of T.G.T.

The board also elected three new vice presidents. They are: L. P. Echols, treasurer; Ralph C. Graham, formerly vice president of Coast Co., and Barney Wilson, geologist and engineer for Sterling.

Offices of the Sterling Oil & Refining Co. will be moved from the present location in the Sterling Building to the fifth floor of the Commerce Building. All personnel of both companies will be retained.

Hurricane Trackers Study Offshore Operators' Needs

HOUSTON.—Officers of the U. S. Navy's hurricane-tracking squadron in Miami, Fla., and representatives of the Offshore Operators' Committee have made a 4-day inspection trip of offshore drilling operations near Grand Isle, La.

Purpose of the visit was to familiarize the Navy's hurricane hunters with the weather problems faced by oil operators drilling in the Gulf of Mexico. In addition, the weather men were told by oil company representatives that other industries in the area, such as refining, chemical, and shrimping, are in need of prior warning of major storms. The Navy men were told that offshore operators had only 18 hours notice of the severe hurricane which struck the Grand Isle area last September.

International

WORLD-WIDE OIL DEVELOPMENTS

Richmond Curtails Venezuelan Activity, Shelves New Refinery

RICHMOND EXPLORATION CO. has temporarily curtailed its drilling program and shelved plans for a new refinery in Venezuela as a result of the decline in demand for heavy fuel oil.

Richmond has been particularly affected by conditions in the fuel-oil market. Most of its production is from Boscan field on the west side of Lake Maracaibo. Gravity of the oil ranges from 9° to 12°.

Reports of curtailment in exploratory and development activities were confirmed by the company which said that three contract rigs were continuing in the Boscan area. These are in charge of Loffland Brothers. Little change is expected in this situation pending an upturn in demand, the company said.

Richmond also is understood to have deferred for the time being its earlier plans to construct a 35,000-bbl. daily plant to process the low-gravity oil with equipment to include vis-breaking units. This plant was to be built near the Bajo Grande terminal of the company on Lake Maracaibo. The company early this year completed a 25-mile pipe line from Boscan to the terminal.

The Western Venezuelan production developed by Richmond is reported to have a potential of about 16,000 to 17,000 bbl. daily. Present production is around 8,000 to 9,000 bbl. daily, and this is expected to go lower later this year with seasonal changes in asphalt demand.

The company is a wholly owned subsidiary of Standard Oil Co. of California. Its concession area totals 885,818 acres adjacent to the lake with some submerged blocks in western Venezuela. It also holds 421,197 acres in the Orinoco delta. Of the Western Venezuela production, a small amount is light oil which last month was being run to storage. A number of personnel dismissals and transfers have resulted from the general curtailment of activities.

In Colombia, Richmond Petroleum Co. is making preparations to spud in what is said to be the first well ever drilled on the west coast of that country. Four vessels were recently put in service shunting equipment from the port at Buena Ventura to Berreberre exploration area on the Rio Baudo. The boats are two 37-ft. cruisers, one 104-ft. former Army Air Force rescue boat, and one 120-ft. LCT. Richmond Petroleum has been carrying on exploration in the area at intervals over the last 25 years.

Bids Sought on 374-Mile Argentine Natural-Gas Line

Direccion General del Gas del Estado (Argentine State Gas Service Department) has called for public bids for a 590-km. (374 miles) 8-in. natural-gas pipe line to be constructed from the fields of Plaza Huincul to General Conesa.

At General Conesa the line will connect with the 10-in. gas line now under construction from Comodoro Rivadavia to Buenos Aires, which is scheduled for completion within a few months. Bids for the line from Plaza Huincul are to be opened on September 12.

Foreign Rotary Rigs Down 33 Since March

LATEST information indicates rotary rigs in operation in foreign areas total about 424, a drop of 33 rigs since last March.

The entire decline is accounted for in Latin America, principally Venezuela, where lower demand for heavy fuel-oil crudes has caused cutbacks in activity. Much Venezuelan drilling is concentrated on developing the lighter oils from the deeper Cretaceous formations in the western part of the country.

The Eastern Hemisphere as a whole shows a net gain of three rigs since last March. All Middle East operations are unchanged except for Turkey where one additional rig is reported in operation.

The high point in foreign rotary rigs was reached last March when a total of 499 was reported. The data exclude Russian - controlled areas, Germany, and Japan. Figures for March and August are shown in the accompanying table:

Country	March 1949	August 1949
Alaska	2	2
Cuba	1	1
Mexico	37	37
Panama	1	0
North America	41	40
Argentina	50	45
Bolivia	2	2
Brazil	5	5
Chile	4	4
Colombia	24	18
Ecuador	11	12
Paraguay	2	2
Peru	21	20
Trinidad	22	22
Venezuela	138	114
E. Venezuela	(67)	(56)
W. Venezuela	(66)	(58)
South America	279	244
England	9	9
Denmark	2	1
France	12	12
Italy	7	7
Netherlands	6	6
Spain	3	3
Europe	39	38
Ethiopia	0	1
Algeria	2	2
Egypt	8	8
French Equitorial Africa	1	1
Morocco	6	6
Tunisia	2	2
Africa	19	20
Bahrein	2	2
Iran	9	9
Iraq	6	6
Kuwait	9	9
Qatar	2	2
Saudi Arabia	7	7
Lebanon	1	1
Syria	3	3
Turkey	2	3
Middle East	41	42
Australia	2	2
China	3	3
Burma	2	2
Indonesia	15	15
Philippines	1	1
India-Pakistan	12	12
New Guinea	3	5
Far East	38	40
Total foreign	457	424

Further Exploratory Work in Guatemala Considered Unlikely

THE Guatemalan Congress has passed a new petroleum law which makes unlikely any further exploration in that country by private capital.

Three United States companies had been interested in Guatemala's oil prospects. Largely because of the uncertain political atmosphere, two of them, Ohio Oil Co. and Standard Oil Co. of Ohio, abandoned their plans. The new petroleum law has caused the withdrawal of the third, Atlantic Refining Co.

The legislation reflects an unfriendly nationalistic sentiment and government hostility to foreign oil investments. The Guatemalan Constitution prohibits oil development by non-Guatemalan interests, but the contracts sought would have allowed the companies to operate in the status of a contractor to the government.

Under the new law, all equipment imported into the country for drilling, construction, or any other purpose would become the property of the government, and any company obtaining production would be required to build a local refinery to meet the country's domestic needs. Any petroleum exports would be under the strict control of the Instituto National de Petroleo, a government agency.

Fines Provided

The law sets up maximum acreage for exploration at about 81,000 acres with leases provided for half that amount when production is obtained. Royalty is 12½ per cent of net profits, increasing to 15 per cent when the initial investment is liquidated. The law also provides for fines up to $100,000 for violations of contracts or of the law.

One oil official in New York commented that the Guatemalans "seem to be thinking in terms of 1946-1947." At that time, the large companies were more willing to accept unfavorable terms in view of the world oil shortage. The situation is completely reversed now, and most companies take a firm position against "going in where we aren't wanted."

Guatemala does not produce any oil at present, but there has been recurrent interest for years in the difficult jungle and swamp area of the department of El Peten and also the Lake Izobal region in the northern part of the republic. Standard Oil Co. (N. J.) did geological work in Guatemala as far back as 1925, and the Shell organization conducted surveys in the mid 1930's but halted work when unable to obtain satisfactory concession terms.

According to reports, Atlantic spent some $500,000 in exploration surveys in the country. A representative of one of the companies recently interested in the country said the geological findings were not too encouraging. It had been estimated that it least $2,000,000 would be necessary to determine the possibilities of production.

Standard Oil Co. of Ohio early this year made an announcement of its efforts to obtain a contract in Guatemala. At that time the negotiations were said to be in an advanced stage. The company began preliminary exploratory work in the country in 1947, and its contract required an act of the Guatemalan Congress.

The new oil law is considered to be in line with the generally unfriendly attitude in Guatemala toward foreign capital, particularly that representing companies of major size. Some foreign concerns in other fields have left the country.

OGD's Carroll to Help Settle Korean Dispute

WASHINGTON.—Don L. Carroll, special assistant to the director of the Oil and Gas Division, will transfer within a month to the State Department, where he will serve as a special consultant assigned to Korea and will leave immediately for Seoul.

Carroll's immediate job will be to settle a three-way quarrel between the South Korea Department of Commerce and Industry, the South Korea Planning Office, and the oil companies supported by the American occupation authorities over the control of the distribution of petroleum products *(The Oil and Gas Journal, August 4, page 30)*.

Since the Army moved out of South Korea early this year in favor of a civilian administration under the State Department, considerable black marketing and other abuses have developed in the distribution of oil products, of which South Korea has no indigenous sources. All oil imports are being financed by the Economic Cooperation Administration through the State Department foreign service.

The operating companies in the country are owned by Standard, Texas, and Shell, and since they store all the oil coming into South Korea under the terms of the economic-aid agreement they and the American authorities believe they should also handle distribution. The two South Korean government agencies are seeking to handle the distribution, the Department of Commerce and Industry seeking to designate special sellers to operate under department supervision, and the Planning Office contending that all oil should be handled by the Great Korean Petroleum Co.

Northeastern France Discovery Is Reported

Pechelbronn, S. A., French producing company, is reported to have made a new oil discovery in the Soultz-sous-Forets area of northeastern France.

The oil was found at a depth of 863 m. (2,840 ft.) with an apparent high initial rate of production. The formation appeared to be the Muschelkalk of Middle Triassic. Details were lacking in preliminary reports, but the well appeared to be a wildcat rather than an extension of Pechelbronn field itself.

Agency Recommends New Refinery for Australia

Construction by the Australian Government of a new refinery of about 10,000 bbl. daily capacity has been recommended by a commonwealth government agency studying postwar reconstruction.

The report noted that Australia's present refining industry, consisting of four relatively small plants, could not handle any oil that might be found as a result of the expensive and thus far unsuccessful wildcatting program being carried out by private capital in Australian New Guinea. The proposed government refinery would cost some six million Australian pounds (about $20,000,000).

Mexico Boosts Gasoline Price to Raise Capital

Petroleos Mexicanos last week raised gasoline prices in Mexico City and announced that increases for the rest of the country are planned.

Mexico City motor-fuel prices were increased about a third. New price of 60-octane was 40 centavos a liter (18½ cents a gallon) and for 70 octane, 50 centavos a liter (23 cents a gallon). Antonio Bermudez, Pemex director, said the increases were necessary because of recent losses and the need for additional capital to develop the industry.

Australian Report: Oil Search Continues

Disappointing Results Fail to Deter Operators in Dollar-Short Country

by Dahl M. Duff

ALTHOUGH two major companies have discontinued exploration in Australia, there is continued study of the oil possibilities of the country with the strong encouragement and support of the commonwealth and state governments.

Several companies backed largely by local capital are making plans to drill, and Shell (Queensland) Development, Ltd., is going ahead with its deep test in central Queensland.

Oil exploration has been carried on intermittently in Australia for nearly 50 years. A number of wells have been drilled at various promising locations throughout the vast 2,948,000-sq. mile area of the island continent.

The production resulting from this activity amounts to something less than 10 bbl. daily at Lakes Entrance in southeast Victoria. The oil is a peculiar type with almost no gas and is obtained from wells drilled into a glauconite sandstone. A new technique involving horizontal drilling is being tried here experimentally. In addition to Lakes Entrance, Australia also obtains several hundred barrels daily of shale oil at Glen Davis in New South Wales.

Short on Dollars

After the war there was renewed interest shown in oil exploration in Australia. While some of this may have stemmed from the oil-shortage conditions of a year or two ago, more recently the impetus has shifted to the dollar-saving feature of finding indigenous production to replace imported supplies.

Besides the various exploration programs in Australia itself, several major companies are associated in an exploration effort in the Australian territories of Papua and New Guinea. Several rigs are running, and the program presumably calls for a thorough investigation of this section of the island.

With motor fuel rationed and the main fuel supply—coal—repeatedly subjected to the hazards of strikes, the Australian public takes great interest in these efforts to find oil. Announcements of exploratory plans usually generate considerable enthusiasm, and Australian officials consider hopefully the possibility that their country could become independent of foreign petroleum shipments if domestic production of major size were found.

The operating company in Papua (southeastern New Guinea) is Australasian Petroleum Co. Pty., Ltd. Forty per cent of shares are held by D'Arcy Exploration Co., Ltd., exploration subsidiary of Anglo-Iranian Oil Co., Ltd., and 40 per cent by Vacuum Oil Co., Pty., Ltd., Australian subsidiary of Standard-Vacuum Oil Co. (Standard Oil Co. [N.J.] and Socony-Vacuum Oil Co., Inc.).

An Australian company, Oil Search, Ltd., holds the remaining interest in Australasian Petroleum. Anglo-Iranian is directing the drilling operations in New Guinea.

Shortly after the war, D'Arcy and Vacuum joined with Zinc Corp., Ltd., an important Australian mining company, and organized local companies for the purpose of exploration in the mainland of Australia. After geological and geophysical surveys in several states, D'Arcy and Vacuum withdrew from the projects, apparently deciding to concentrate their efforts on the more promising Papua-New Guinea operation. At the present time, Zinc Corp. is continuing exploration work in the southwest part of the Great Artesian Basin in the hope of finding natural-gas supplies. Last year it drilled a well to 3,256 ft. at Kopperamanna, northwest of Lake Frome.

On the Australian mainland as well as in New Guinea the commonwealth government takes every occasion to assist and encourage oil exploration work. It is the announced policy of the central government to aid the oil companies in preliminary surveys and through the services of its active Bureau of Mineral Resources.

Geophysical surveys of some of the more prospective oil areas in Australia have been carried out by the commonwealth bureau, and government parties have on occasions been made available to companies. The Royal Australian Air Force now has under way a project for the aerial mapping of the entire mainland, a task expected to take 6 or 7 years. One of the stated purposes is to assist oil exploration.

Government Cooperative

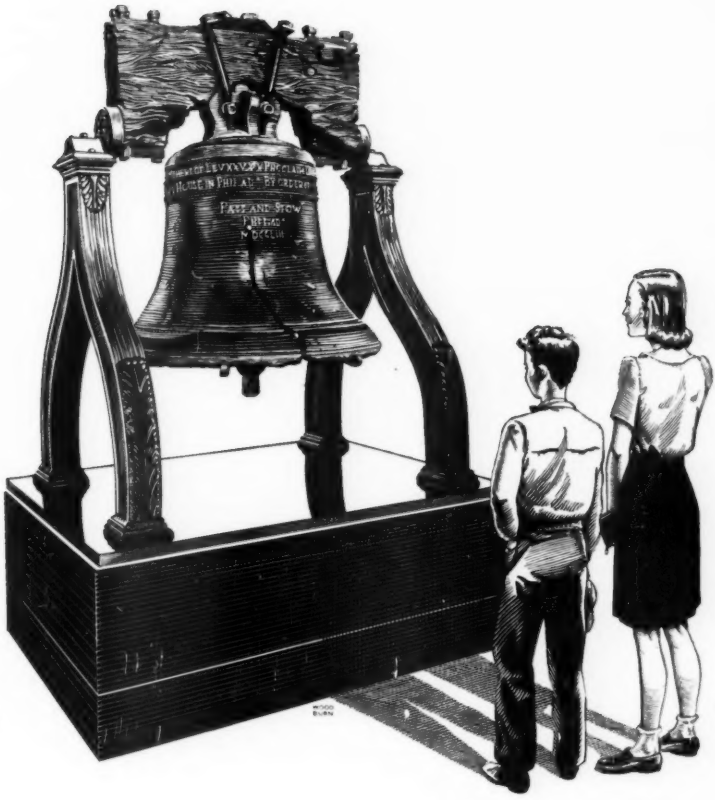
The commonwealth and Victoria governments assisted in the exploration in the Lakes Entrance district, and in the Papua-New Guinea territory. Previous exploration has been carried on intermittently in the latter area since early in the century with commonwealth government subsidies.

One of the deeper wells drilled with government assistance was on the south coastal sedimentary basin of the mainland in the states of South Australia and Victoria. The test reached a depth of 7,300 ft. early in 1948. Operations were suspended since the limits of the tools had been reached, though the well was not in the basement. The location was in the Nelson area of Victoria.

There are three principal sedimentary basins on the Australian mainland in which a large part of the oil exploration is taking place. One of these is the Great Artesian Basin in Queensland, South Australia, and New South Wales.

The other two are in Western Australia, the Desert (Kimberley) Basin of some 150,000 sq. miles and the smaller North West Basin lying along

Capertee Valley, at Glen Davis, New South Wales, where war caused the opening up of huge shale-oil deposits previously considered too costly to work



What price liberty?

IT was Daniel Webster who said, "God grants liberty only to those who love it and are always ready to guard and defend it."

Today in our yearning for "security", we are inclined to forget about that "liberty" for which this old bell rang out. The two are not synonymous. When we permit a benevolent government to assume more and more responsibility for housing, feeding, hospitalizing, and even entertaining our citizens, we must in return expect to surrender more and more of our personal rights and liberties.

Actually, the only security any man can enjoy with liberty is the security he earns through his own initiative, resourcefulness and productivity. As community leaders, it is our responsibility to help our fellow citizens realize that for the delusion of government-guaranteed security they are sacrificing liberty.

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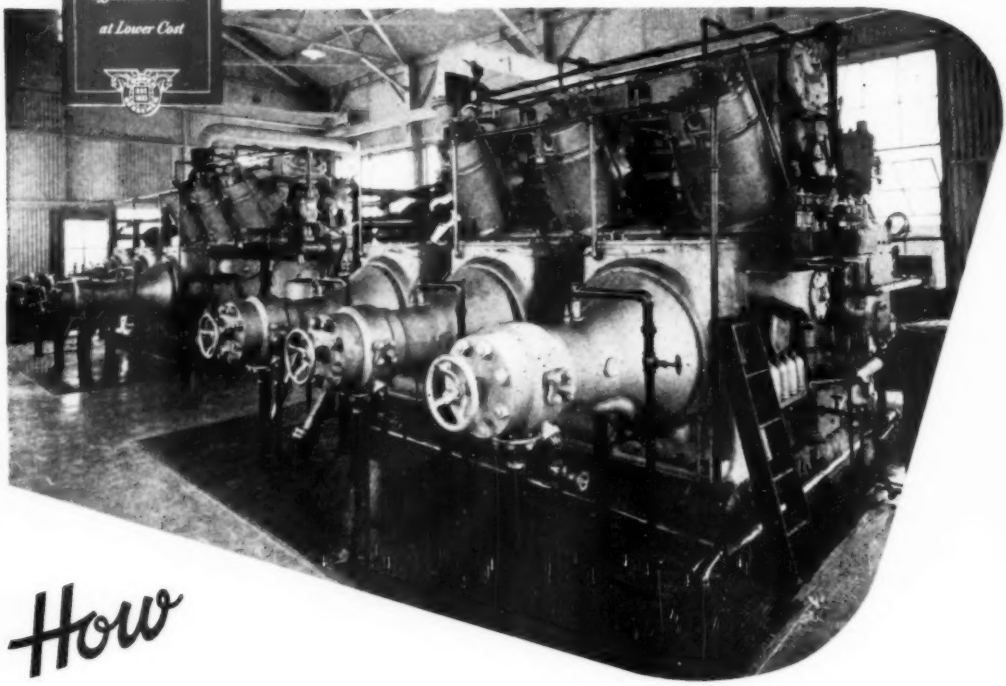

How GMV compactness and durability pays off

for Western Natural

The two Cooper-Bessemer GMV compressors you see here have outlived the cycling requirements in one field . . . and are now doing an efficient job in a new location. Installed eight years ago at Edinburg, Texas, they were recently transferred by Western Natural Gas Company to handle the compressor requirements at their new Goebel cycling plant in Live Oak County, Texas.

This "case history" is significant. First, it testifies to the long, efficient life of these modern Cooper-Bessemer V-angles — units that obviously are ready for many more years of trouble-free, low-cost operation. Secondly, it emphasizes the advantage of GMV compactness — compressors that are installed, housed, operated and maintained at exceptionally low cost.

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the western coast. North West Basin includes North West Cape and the well-known Cape Range anticline. Closely to the southeast is the smaller Rough Range anticline.

The Cape Range anticline was observed some 20 years ago by the late F. G. Clapp, American geologist, and has long been considered a possible oil structure. In recent months new interest has resulted from the investigations of Ampol Petroleum Co., formerly Australian Motorists Petrol Co., Ltd.

Ampol holds approximately 200,000 sq. miles in exploration permits in Western Australia and 28,000 sq. miles in the Northern Territory adjoining the Kimberley division of Western Australia. The Western Australia area is held in conjunction with two American companies, Richfield Oil Corp. and reportedly Signal Oil & Gas Co.

Geologic Study Required

In its annual report, Ampol said 6 months to a year of detailed geological work is needed before undertaking the expensive drilling operations in this remote area. W. C. Walkley, Ampol's managing director, said the company may start drilling next January and go to 10,000 or 11,000 ft. if necessary.

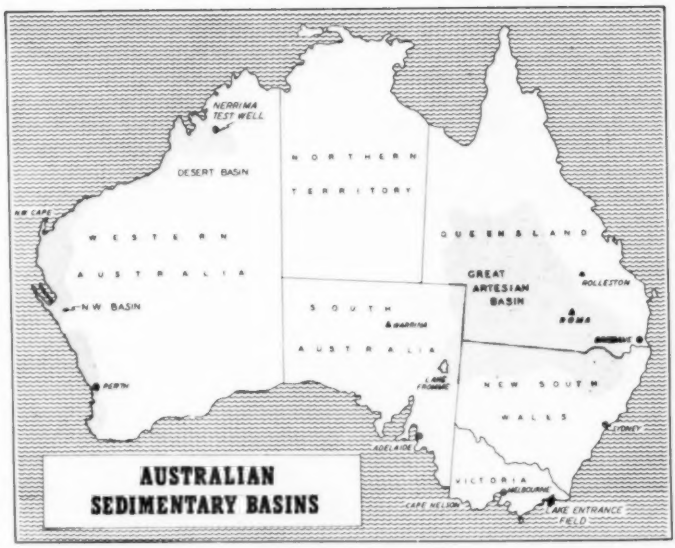
The prospects of an oil discovery in the North West Cape area have been somewhat discouraged by the fact that a number of water wells, some relatively deep, failed to encounter any shows, either oil or gas. A test for oil, however, still remains to be drilled.

Earlier this year, Eric K. Craig, a California geologist, studied the area, and later in Sydney he said that while some of the structures look quite favorable the question could be settled only by deep drilling. Craig estimated the extent of the Cape Range at about 8 by 2 miles. Because of its easier access for heavy equipment, he suggested Rough Range should probably be drilled first. The area, he added, is a good bet for a large well-financed oil company.

Two other California geologists, Stanley C. Conrad and Robert G. Maynard, visited the area last year and in a report, part of which was issued by the Ampol company, said:

"Structurally the North West Cape area appears very promising for petroleum exploration. The Cape Range anticline almost certainly has over 500 ft. of closure and probably over 1,000 ft. The crest of the structure is very large and flat and would furnish a huge area for accumulation of oil if porous reservoir rocks are present beneath the Tertiary rocks exposed. Rough Range almost certainly would furnish 400 ft. of closure and is relatively a large structure, although dwarfed by the Cape anticline . . ."

On the lower Fitzroy River in the Desert (Kimberley) Basin of Western Australia, Freney-Kimberley Oil Co. commenced its Nerrima well before the war. The hole was taken to 4,271 ft., and then operations were suspended after the Japanese bombed Darwin. There have been recurrent reports that this well will soon be resumed with state and commonwealth aid.



Map of Australia showing the four sedimentary basins

The commonwealth Bureau of Mineral Resources has studied several prospective areas of Western Australia. Its director, Dr. H. G. Raggatt, said the bureau has always considered the Exmouth Gulf section, including North West Cape, as quite promising. Also, he said, the bureau was extremely interested in an area of the Kimberley Basin.

The Shell deep test in central Queensland is scheduled to be spudded in the second half of this year. The location is in the Warrinilla area about 105 miles north of Roma.

This operation has attracted considerable attention in Australia. A report from Brisbane said the well would mark the climax of 8 years of exploration effort by the company which has cost the equivalent of about $4,000,000.

The Roma district has been of interest since 1900 when artesian-water-well drillers found natural gas at 3,683 ft. The gas was used in the town of Roma until a fire destroyed the plant and the well. Since that time a number of both shallow and deep wells have been drilled. One of these was by Oil Search, Ltd., at Arcadia, some 90 miles north of Roma, where a large flow of gas consisting mainly of carbon dioxide was encountered.

Shell has conducted core-drilling and a geological program in the area. If its well is taken to 10,000 ft., as indicated, it will be the deepest ever drilled on the Australian mainland. Shell's general manager in Australia, I. Luxon, said earlier this year that the company feels there is a "reasonable chance" of finding oil in Queensland. The commonwealth Bureau of Mineral Resources is making a magnetic and gravity survey of the Roma area and this year hopes to complete reflection seismic work. Several smaller companies representing Australian capital also are interested in the Roma area.

International
WORLD-WIDE OIL DEVELOPMENTS

At present, Australia's 7,580,000 persons use approximately 32,000 bbl. daily of motor fuel in addition to other petroleum products. Australian officials concede that the search for oil thus far has been disappointing but by no means exhaustive. They feel that probably the best prospects are in Papua-New Guinea, but at the same time believe the chances of a discovery on the Australian mainland are still good, particularly in view of the geological and geophysical work being carried on and the several projected test wells.

Reflecting Australia's desire to find its own sources of petroleum, the prime minister, Joseph B. Chifley, recently said the government had allotted considerable sums to buy exploration equipment for use in Australia, New Guinea, and Papua. At the same time he reported that Australia's efforts to acquire oil-producing properties in Indonesia and the Middle East had been unsuccessful.

WASHINGTON WATCHING

BY BERTRAM F. LINZ

For Want of a Man

WASHINGTON. — Filling the job just vacated by Walter J. Levy as chief of the petroleum branch of the Economic Cooperation Administration may prove to be almost as difficult as that of finding a man to head the Oil and Gas Division.

And when those two posts are filled, there still will be vacancies in the Government for good oil men, two or three in the OGD which probably will not be filled until a new director comes in.

So far, Administrator Paul G. Hoffman has no one in mind to succeed Levy, who has promised to act as special consultant to the administrator until his successor is found.

A National Petroleum Council committee is working on both jobs. It has been working on an OGD director for 8 months or more with a conspicuous lack of success. Last month it took on the task of helping ECA find a man.

The OGD has been without a helmsman so long that there is some speculation whether it will be retained as a going agency much longer. There are rumors that Interior Secretary Krug may resolve the problem of finding a director by asking the President to rescind the executive order establishing the office, but department officials have denied any such move is in prospect.

Some oil men believe it has become imperative that a director be found without further delay, fearing that if Krug makes any move to eliminate OGD it would mean the end of Government-industry cooperation and dissolution of the National Petroleum Council.

Finding a man to take over the oil desk at ECA should present less difficulty, the major obstacle being the comparatively small salary which goes with the job as compared with the salaries paid by the oil companies.

Who's Lobbying?

A REAL investigation of lobbying, covering the activities of both governmental and nongovernmental "legislative representatives" is in sight for next year as a result of the action of the Senate rules committee in approving legislation already passed by the House, providing $50,000 for such an inquiry.

The investigation will be conducted by a joint House-Senate committee and will cover "all lobbying activities intended to influence, promote, or retard legislation."

The move to make such a study was prompted by the reports filed under the lobbyist registration law passed by the last Congress, which show that there are several thousand persons in Washington who devote all or part of their time to working for or against legislation coming up in Congress, many of them at more than substantial salaries.

At the same time, there has been increasing complaint at the Capitol that the federal departments and agencies are vigorously engaged in attempting to influence legislation that might affect their activities and appropriations, and there is a strong demand that this type of lobbying also be investigated.

A number of men representing oil associations or companies are registered under the act. They work in the open. On the other hand, the Interior Department, Military Establishment, and other agencies also have "liaison" men to "inform" members of Congress on pending legislation, more often than not taking a position opposed to that of the industry, who are not registered.

State's Shake-Up

INTRADEPARTMENTAL controversies are reportedly holding up a long overdue reorganization of the State Department which would break up the present petroleum division and assign its experts to the geographic offices which would become the backbone of the department structure.

Currently, the petroleum division under Robert H. S. Eakens covers the world, with experts on Latin America, Europe, etc., watching developments in the various areas. To some extent, the geographic divisions also watch oil matters, but do not have any commodity experts.

A reorganization plan proposed before the Hoover commission made its report contemplated centralization of all commodity activities in the geographic divisions, but foreign-service officers are understood to have resisted the idea.

Recently Secretary Dean Acheson has brought new men into the department whose forte is administration rather than knowledge of foreign affairs, and new studies have been made of the responsibilities of the various offices. Acheson himself has been so engrossed in pressing the legislation for ratification of the Atlantic Pact and funds for rearming Western Europe that he has not had time to go into the matter of reorganization.

State Department men say privately that the differences among the several groups on reorganization will make it necessary for the secretary to take a firm stand and personally direct the changes which are to be made.

Curmudgeon Gripes

HAROLD L. ICKES, who once held a multiplicity of government jobs including that of Petroleum Administrator for War, definitely doesn't approve of the idea of putting Atty. Gen. Tom C. Clark on the Supreme Court bench, charging in an article in the New Republic that Clark ran out on the administration in the tidelands case.

As those of an individual, Ickes' views aren't any more important than those of Joe Doakes, but because it was he who started the tidelands fight there is still some interest, if no influence, in what he has to say on oil matters—sort of an Elder Statesman without portfolio, so to speak.

Ickes makes it clear that he likes neither Clark nor his successor in the vast reaches of the Interior Department, J. A. Krug. In fact, he not only charges that Clark never made any attempt to carry out the Supreme Court mandate in the California case but that he "conspired with his cabinet 'buddy'" Krug to make it impossible to carry out that mandate.

According to Ickes, Clark is an "inconsequential lawyer" who was kicked out of his job as an assistant attorney general by being made attorney general and now is being kicked out of that office by appointment to a still higher one. Which seems to make the Ickes formula for advancement just do a poor job to get a better one.

But Ickes does have pleasant tidings for the oil industry: in Clark it will be able to boast of a friend on the court, he said.

Adjournment Troubles

THE House of Representatives will clean up its slate and be ready to go home around the end of the month, but over in the Senate the administration leaders are beginning to talk about a November adjournment.

In an effort to speed up action, Senate Majority Leader Lucas is ready to take the unusual action of

(Continued on page 196)

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O'Mahoney Balks at Tidelands Compromise, Pushes Own Bill

WASHINGTON.—The whole question of tidelands legislation was thrown into confusion last week. Sen. Joseph C. O'Mahoney of Wyoming refused to introduce either of the bills prepared by the Interior Department and the state officials and decided to stand on the bills he sponsored earlier this year. These call for administration by the Government and delineate the inland waters to which the states would be given full rights.

Although the measures did not go in on the Senate side of the Capitol, Rep. Frances E. Walter of Pennsylvania introduced both bills in the House August 15.

O'Mahoney declared that the negotiations between the state and federal officials had wound up in complete failure, but House Speaker Sam Rayburn of Texas, who supervised the discussions, denied that such was the case.

Rayburn Backs State Bill

Rayburn said he himself would stand back of the bill drafted by the state officials. The bill prepared by the Interior Department, he said, was entirely unacceptable to him. He indicated no interest in whether the department bill would be introduced or the Administration would line up behind the measures sponsored by O'Mahoney.

"I have reached the conclusion that negotiations which have been going on for several months . . . have proved unfruitful," O'Mahoney said. "It seems to me there is no possibility of any agreement among those participating on a bill which I would be willing to introduce."

Any further negotiations, O'Mahoney said, now can take place in public hearings.

O'Mahoney said the two bills he has introduced would dispose of all the questions raised by the state and federal officials.

His first bill, introduced February 10 at the request of the Interior Department, provides for federal management of the tidelands but makes no provision for a distribution of royalties.

The second bill, he said, surrenders to the states complete authority over the inland waters. So under these two bills we could guarantee to the states complete control over the inland waters.

"I had envisaged the states having a major royalty return in the marginal seas—only 37½ per cent going to the federal Government—as well as a substantial part—37½ per cent of the royalties—in the continental shelf. Thus the states would get 62½ per cent in the marginal seas and 37½ per cent in the continental shelf.

"The issue of completely unified management of the entire area—continental shelf and marginal seas—is very essential. I would not feel free to surrender it," O'Mahoney concluded.

O'Mahoney said he did not know if the two new bills would be introduced or, if so, by whom. No decision has been made, however, to let the matter ride until next year.

"I know from a reading of the two bills (which were suggested as a result of the conferences—one by the Interior Department and the other by state officials) that there can be no agreement," he told reporters. "There just is no compromise."

Chief differences of the federal and state bills are these:

The state bill says the boundary of the marginal belt shall be 3 miles seaward from the coastline, except for Texas, which would retain the boundary "as it existed at the time such state became a member of the Union." The federal bill says 3 miles without exception.

The state bill provides that leases issued by the states before January 1, 1949, may be exchanged for federal leases. The date is June 23, 1947, under the federal bill.

The state bill would give each coastal state 50 per cent of all receipts from the continental shelf, while the federal bill contains no such provision.

The state bill contains provisions that each state shall manage activities in the marginal belt. No such provision is in the federal bill.

The federal bill authorizes the President to withdraw any submerged coastal lands and reserve them in the interest of national security. This provision is not in the state bill.

New Drilling Firm Buys Hawkins Properties

DELTA GULF DRILLING CO., a newly organized firm, has purchased practically all of the properties of J. C. Hawkins, Dallas, for a reported $15,000,000.

These properties include full or partial interest in 135 producing oil or gas wells, producing royalties, wildcat leases, and 22 heavy-type rigs.

Delta Gulf will be an associate company of Delta Drilling Co., which has its headquarters in Tyler, Tex. Joe Zeppa is president of both firms and treasurer of Delta Gulf. Hawkins will be a vice president of the new concern.

The new company will operate rigs in West and Southwest Texas, the Texas Gulf Coast, and in Mississippi and Louisiana. Delta Drilling Co. operates in East Texas, North Louisiana, Arkansas, Kentucky, Indiana, Illinois, and the Rocky Mountain area.

Delta Gulf will have its headquarters in the Mercantile Bank Building, Dallas.

Zeppa said the new company may decide to sell some of its drilling rigs and a part of the undeveloped leases and royalties.

Working capital for the new company, reported in excess of $1,500,000, is being advanced by Zeppa and Delta Drilling Co.

Next Week

It pays to modernize.—W. S. McAllister, superintendent of Warren Petroleum Corp.'s Gladewater (East Texas) gasoline plant, describes improved performance, greater production obtained by well-engineered program.

Depropanizer instrumentation.—H. P. Breedlove, instrumentation specialist at Esso Standard's Baton Rouge refinery, describes revisions made and improvements in plant operation.

Lost Soldier field, Wyoming.—Eight separate pays plus 2,200 ft. of producing closure give highest barrel-per-acre recovery in Rocky Mountain area. Article by district editor Roy F. Carlson.

Modern machine shop.—Equipment used by Gulf at Harmarville, Pa.

Ground-water supplies.—Development guide charts, prepared by John B. Millis, industrial consultant in this field.

Gas-turbine-driven pumping unit.—Installed experimentally on natural-gas transmission line to test feasibility for such service.

New chemical treatment of flood water.—For bacteria and corrosion control. Article by Joseph N. Breston, laboratory director, Pennsylvania Grade Crude Oil Association, Bradford, Pa.

PERSONALS

Bothwell Is Veteran of Gulf Oil's Production

E. C. BOTHWELL, vice president in charge of production for Gulf Oil Corp., who was recently elected to the company's board of directors and a member of its finance committee, is a man of wide experience in the production and exploration field and is a veteran of early-day oil development in the Mid-Continent area.

As a member of one of the early Oklahoma oil companies, Bothwell pioneered in development of the famed Glenn pool, the first great oil field in the state. He joined Gulf Oil in 1915 as a geologist in the production office in Tulsa, and the following year, in recognition of his outstanding work for the company, was moved to its main headquarters in Pittsburgh as assistant to the vice president in charge of production.

In 1935 Bothwell was elected a vice president of the corporation and since that time has been in charge of all its production and exploration activities, both of domestic and foreign. In the future, his efforts will be devoted to general corporate matters and over-all direction of production interests.

Mitt Dowlen, plant foreman at the Hastings gasoline plant near Alvin, Tex., for Stanolind Oil & Gas Co., has been named superintendent of the Levelland, Tex., plant, and **C. J. Tighe,** superintendent of the Stano gasoline plant near Ulysses, Kans., has been named superintendent of the South Fullerton plant near Andrews, Tex. **David M. Liles** has been named superintendent of the Ulysses plant replacing Tighe, and **D. B. Warner** will replace Liles as foreman at the plant. **Eugene J. Yocom,** superintendent of the Hastings plant, has been transferred to Tulsa as an operating engineer; **John E. Thomas,** formerly superintendent at the La Rosa recycling plant at Woodsboro, Tex., will succeed Yocom at Hastings. **Stanley A. Wrightman** replaces Thomas at La Rosa, and **Edward M. Bush,** plant engineer at La Rosa, has been promoted to plant foreman. Dowlen's position as foreman at the Hastings plant is being filled by **D. F. Lacy.**

S. E. Wallette and **J. C. Gill,** in charge of the district geological office at Columbia, Miss., for Humble Oil & Refining Co., have been transferred to the Sunniland, Fla., office.

Laurence F. Lees and **E. Russell Lloyd, Jr.,** exploration geologists and engineers, have become associated with **John M. Hills, E. Russell Lloyd,** and **William Y. Penn,** Midland, Tex., and will concentrate on activities in the Permian basin.

K. W. Kugh, Phillips Petroleum Co., Bartlesville, Okla., has been named chairman of the legislative committee of Liquefied Petroleum Gas Association, Inc. **E. O. Mattocks,** also with Phillips at Bartlesville, has been named chairman of the association's technical and standards committee.

Jay M. Killen, who recently received his degree in refinery engineering at University of Tulsa, has joined Standard Oil Co. (Ohio) as an engineer at Cleveland, Ohio, as a member of the technical service staff.

W. W. Ramseur, petroleum engineer at Laurel, Miss., for Gulf Oil Corp., has been promoted to production superintendent at Laurel, succeeding **T. R. Bibee,** who has joined the Houston office in the employe-relations department.

A. O. Oberwetter, tool pusher for Phillips Petroleum Co. at Roswell, N. M., has been transferred to Lovington, N. M.

H. E. Clark, production foreman at Seguin, Tex., for The Texas Co., has been moved to Charlotte field, Charlotte, Tex.

Seth Tyler, terminal superintendent at Borger, Tex., for Phillips Petroleum Co., has been transferred in the same capacity to the Laverne, Okla., terminal, products pipe-line department.

L. A. Skinner, driller and tool pusher for Superior Oil Co., has been transferred to the production department at Houma, La.

Dalton Moore, Jr., district engineer for Chicago Corp. at Carthage, Tex., has been moved to Bishop, Tex., where he will serve in the same capacity.

J. Don Wiet, district manager of the lower Gulf Coast region of Phillips Petroleum Co., has been transferred from Oklahoma City to Corpus Christi as district manager of crude-oil purchases.

J. M. Harlan, seismograph party chief for Continental Oil Co. at Enid, Okla., has been transferred to the Shattuck, Okla., area.

Lee C. Bock, who has been general purchasing agent since August 1946 for Gulf Oil Corp., has been named in charge of purchases for all Gulf companies. **Donald G. Clark,** director of purchases, recently retired due to ill health, and that position is being discontinued.

Elmer T. Ireton, petroleum engineer with Stanolind Oil & Gas Co. at Levelland, Tex., has been transferred to Shreveport, La., as petroleum engineer in the central division office.

H. A. FOUTE

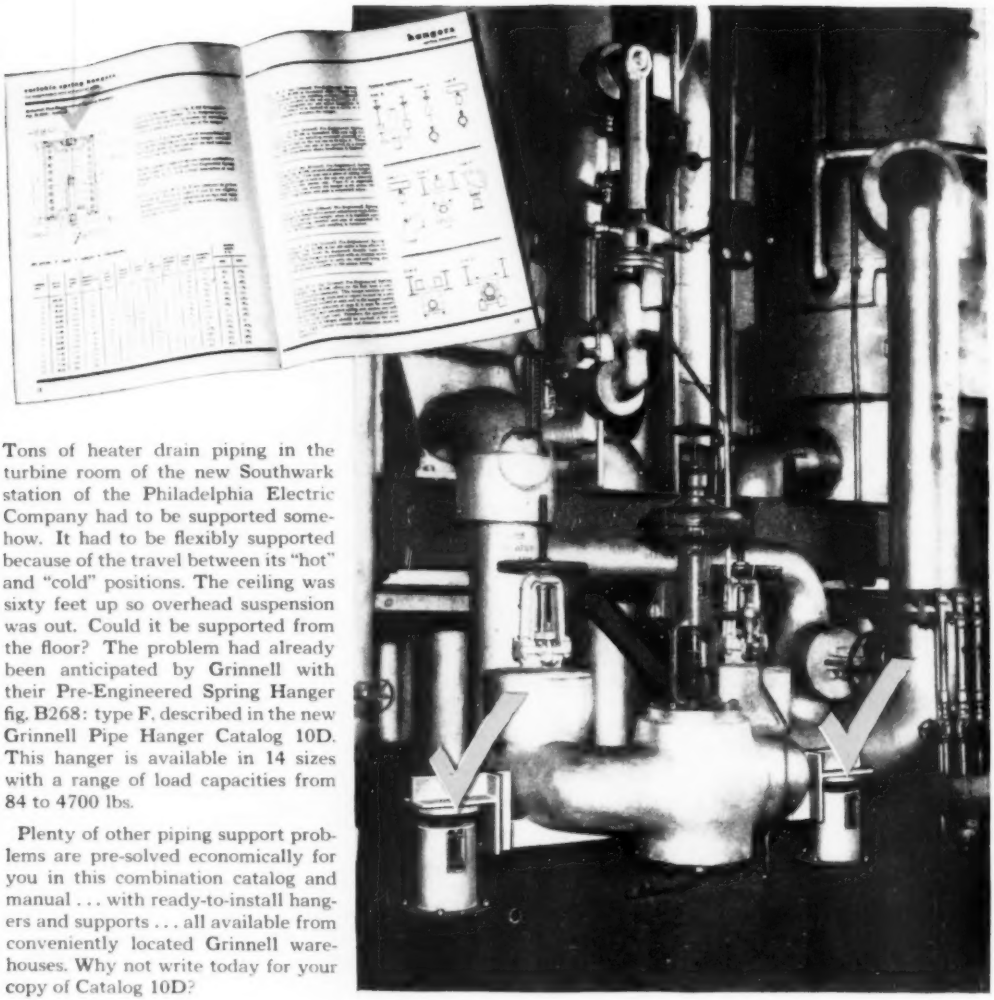
H. A. Foute, The Texas Co., has been named superintendent of the company's refinery at San Antonio, Tex., replacing **A. E. Higgs,** who was was named superintendent of the company's Casper, Wyo., refinery. Foute formerly was superintendent of the company's El Paso, Tex., refinery.

Allison L. Hornbaker has been named geologist in charge of the Kansas Geological Survey's Southeast Kansas field office in Pittsburg.

W. P. Knick, production foreman at Avenal, Calif., for Union Oil Co. of California, has been transferred to Coalinga, Calif., as production foreman.

W. S. Moses, petroleum engineer, California Co., has been transferred from Hico-Knowles, La., to Lake St. John, La. Other recent changes include: **S. D. Marretta,** promoted from

The problem was "special" but the solution came "out of stock"



Tons of heater drain piping in the turbine room of the new Southwark station of the Philadelphia Electric Company had to be supported somehow. It had to be flexibly supported because of the travel between its "hot" and "cold" positions. The ceiling was sixty feet up so overhead suspension was out. Could it be supported from the floor? The problem had already been anticipated by Grinnell with their Pre-Engineered Spring Hanger fig. B268: type F, described in the new Grinnell Pipe Hanger Catalog 10D. This hanger is available in 14 sizes with a range of load capacities from 84 to 4700 lbs.

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mechanic to chief engineer at Grand Isle, La.; and **H. A. Benoit,** pipe-line gager, Barataria, La., promoted to gang pusher at Bay Marchand, La.

Philip C. Dixon, oil and natural-gas engineer, Houston, has been named executive vice president of Midstates Oil Corp., subsidiary of Middle States Petroleum Corp., and will be headquartered in Tulsa. **George M. Vandaveer, Jr.,** Tulsa, has been named vice president in charge of production and engineering; and **W. H. Blackburn,** associated with the company since 1919, has been named a vice president. Dixon, after graduation from Colorado School of Mines, became a member of that school's faculty as professor of petroleum engineering. He later established consulting engineering practice

PHILIP C. DIXON

G. M. VANDAVEER

W. H. BLACKBURN

in Houston, specializing in pressure maintenance and cycling operations. Vandaveer formerly was with E. H. Moore, Inc., and Phillips Petroleum Co., and is a graduate of University of Wyoming. Blackburn has been with the firm in a managerial capacity for more than 20 years, working with the late N. T. Gilbert, former executive vice president.

Frederick C. Loomis has been appointed oil purchase and exchange agent for Standard Oil Co. of California, in charge of all the company's oil purchase and exchange negotiations and agreements. He will be assisted by **Frank L. Frick.**

J. R. McCready has been appointed to the office of the crude-oil purchasing department of Sohio Petroleum Co. He will continue his headquarters in St. Louis.

Martin Matson, formerly district geologist for Pan American Production Co., Corpus Christi, has resigned to open an office as consulting geologist in that city.

J. T. Wood, Jr., manager of the Pacific Coast division of the producing department of The Texas Co., has been made assistant to the president in New York City, and **E. R. Filley,** manager of the producing department in Houston, has been promoted to general manager of that department. **James H. Pipkin,** assistant to the president of the company since 1944, has been made assistant to the Texaco board chairman, and **J. H. Plus,** assistant manager of the Pacific Coast division, succeeds Wood as division manager. Wood joined Texaco in 1929 and has been manager of the Pacific Coast producing operations since 1938. Filley joined a company subsidiary in 1914 and became assistant manager of the producing department in 1938 and manager in 1947. Pipkin took a position in the legal department in Houston in 1934 and was transferred to New York in 1942.

P. A. Wallace, chief geologist for Stephens Petroleum Co., has resigned and will open an office in Oklahoma City with **Paul R. Traugh** as an independent consulting geologist.

Albert Trammell, district gager at Sundown, Tex., for Texas-New Mexico Pipe Line Co., has been transferred to the Loco Hills, N. M., area in the same capacity.

D. M. Rounds, member of the land and geological department, The Texas Co., Salem, Ill., has been transferred to the Wichita office. He will be succeeded in Salem by **Paul Youngmeyer.**

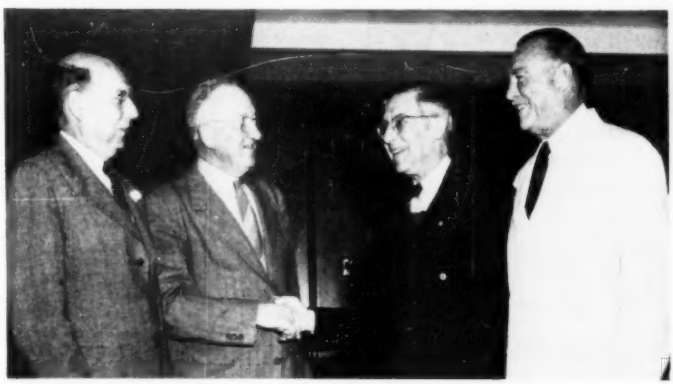
J. B. Taylor, Jr., of Signal Oil & Gas Co., past president of Southern California Meter Association, has been elected president of California Natural Gasoline Association.

M. Leon Jacque, president and director-general of the French Petroleum Institute, is scheduled to arrive in New York August 20 for a stay of about 2 months in the United States. He will participate in the United Nations resources conference at Lake Success, N. Y., and later visit other parts of the country. He also is maitre de conferences of the Polytechnical School in Paris.

J. R. Vandever has been named general superintendent of the production department of Sunray Oil Corp. He formerly was assistant general superintendent of the company's producing activities and has been with the firm since 1930.

Marshall R. Young, one of the original organizers of Roeser & Pendleton, Inc., Fort Worth oil producing firm, has been named president of the organization. He formerly was vice president. Along with his promotion, **Arthur M. Brackett,** Fort Worth, and **G. P. Crutchfield,** Albany, Tex., were named vice presidents, and **Philip R. Walker** was appointed secretary-treasurer. The new officers were named to the board of directors, along with **O. K. Shannon, Jr.,** and **George Thompson, Jr.,** Fort Worth, and **Pope N. Kelly,** Brookhaven, Miss.

Dr. Saul Winstein, University of California, Los Angeles; **Dr. A. D. Walsh,** University of Leeds, England; **Dr. O. A. Hougen,** University of Wisconsin; **Dr. Hugh S. Taylor,** Princeton; and **Dr. R. L. Pigford,** University of Delaware, have been chosen to con-



The man who hired President Robert L. Minckler of General Petroleum Corp. a quarter of a century ago presented him with a diamond 25-year service pin recently. Making the presentation to Minckler was Wesley Cunningham (second from right), now treasurer and comptroller of the company. Looking on are (far left) P. S. Magruder and Clarence Beesemyer, executive vice presidents. Cunningham hired Minckler in 1924 as an accountant. He became assistant to the president in 1934, a director in 1941, and president in 1947

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PERSONALS

duct the fourth annual "Lectures in Science" series at Humble Oil & Refining Co.'s Baytown, Tex., refinery.

E. E. Rehn, formerly geologist for Sohio Petroleum Co., has resigned from the company and has opened offices in Evansville, Ind., as an independent oil operator and consulting geologist. Prior to his resignation, he had been serving as division geologist of the company's western division, headquartered in Oklahoma City.

James H. Hester, drilling superintendent for Ohio Oil Co. at Chickasha, Okla., has been transferred to Haynesville, La.

Bevin O. Smith, driller for Continental Oil Co. at Stephensville, Tex., has been transferred in the same capacity to Bismarck, N. D.

R. F. Fields, Southern California Gas Co., was recently elected president of Southern California Meter Association, to serve during 1949-50. Other newly elected officers of the association include: **J. E. Adams,** Signal Oil & Gas Co., vice president; **G. H. Forster,** The Texas Co., secretary-treasurer; and **J. T. H. Morris,** Southern California Gas Co., auditor.

SHIFTS—

J. O. Jones, superintendent, Trinity Gas Corp., Hebbronville to Falfurrias, Tex.; **George H. Pipe,** refinery engineer, Foster Wheeler Corp., Houston, to Kansas City, Mo.; **William G. Abbott,** engineer, Amerada Petroleum Corp., Longview to Big Lake, Tex.; **John W. Evans,** foreman, Williams Brothers Corp., Palestine, Tex., to Port Jervis, N. Y.; **F. H. Callaway,** engineer, Stanolind Oil & Gas Co., El Dorado, Ark., to Tulsa; **Leon Krause,** engineer, Ashland Oil & Refining Co., Salem, Ill., to Henderson, Ky.; **Harold R. Park,** refinery engineer, Cities Service Oil Co., East Chicago, Ind., to Bartlesville, Okla.; **John C. Ripley,** engineer, Shell Oil Co., Inc., New York City to Newtonville, N. Y.; **Clarence T. Johnson,** engineer, Core Laboratories, Inc., Panquitch, Utah, to Worland, Wyo.

W. M. Hastings, geologist, Gulf Research & Development Co., Gillette, Wyo., to Pittsburgh; **Henry Bollig,** superintendent, Ryan Consolidated Petroleum Corp., Okmulgee, Okla., to Borger, Tex.; **R. M. Brackbill,** engineer, Shell Oil Co., Inc., Perry, Okla., to Oklahoma City. **J. G. Klein,** geologist, Continental Oil Co., Ponca City, Okla., to Bismarck, N. D.; **Parke A. Dickey,** geologist, Carter Oil Co., Tulsa to Lander, Wyo.; **W. J. Arnold,** Amerada Petroleum Corp., Lamessa to Childress, Tex.; **W. B. Brinnon,** Magnolia Petroleum Co., Roswell to Portales, N. M.

Victor Bychok, Atlantic Refining Co., Rankin to Big Spring, Tex.; **C. P. Porter,** superintendent, Coast Oil Corp., Alice, Tex., to Dallas; **W. A. McLaughlin,** Stanolind Oil & Gas Co., Fort Worth, to Carlsbad, N. M.; **C. E. Walker,** refinery engineer, Gasoline Plant Construction Corp., Kermit, Tex., to Houston; **J. T. Gist,** engineer, Pacific Western Oil Corp., Midland to Casper, Wyo.; **Edd Riddle, Jr.,** geologist, Texas Pacific Coal & Oil Co., Midland, Tex., to Sheridan, Wyo.; **Ardee Morgan,** superintendent, Trinity Drilling Co., Wichita Falls to Wills Point, Tex.; **William R. Banks, Jr.,** engineer, Kerr-McGee Oil Industries, Inc., Morgan City, La., to Bristow, Okla.; **E. W. Fort,** engineer, Shell Oil Co., Inc., New Orleans to Dallas; **Charles H. Hesser,** engineer, Continental Oil Co., Vivian, La., to Lance Creek, Wyo.

A. J. Rogers, geologist, Skelly Oil Co., Lewisville, Ark., to St. Marys, Kans.; **Paul H. Smith,** superintendent, Refinery Engineering Co., Pana, Ill., to Tulsa; **Warren B. Warden,** refinery engineer, Sun Oil Co., Bound Brook, N. J., to Philadelphia; **Cliff Rockhill,** superintendent, Wycomo Oil Co., Denver to Hartsel, Colo.; **C. B. Smith, Jr.,** Continental Oil Co., Carlsbad, N. M., to Pecos, Tex.; **Austin J. Six,** superintendent, Atlantic Refining Co., Odessa to Midland, Tex.; **Kenneth L. Smith,** engineer, Stanolind Oil & Gas Co., Ellinwood, Kans., to Levelland, Tex.; **R. T. Widney,** engineer, Cities Service Oil Co., Hutchinson, Kans., to Mt. Sterling, Ill.; **Damon P. Swain, Jr.,** engineer, Stanolind Oil & Gas Co., Lyons to Ulysses, Kans.

Donald W. Buchanan, engineer, Stanolind Oil & Gas Co., Lander to Riverton, Wyo.; **Ernest Allen, Jr.,** engineer, Phillips Petroleum Co., Bartlesville, Okla., to Dallas; **Joe Tracey Williams,** Carter Oil Co., Cordell to Ardmore, Okla.; **L. Decker Dawson,** foreman, Republic Exploration Co., Cushing to Okmulgee, Okla.; **O. H. Blexrud,** geologist, Magnolia Petroleum Co., Lindsay, Okla., to Oklahoma City; **S. L. Friederichs,** engineer, Phillips Petroleum Co., Oklahoma City to Phillips, Tex.; **A. A. Milton,** foreman, Seismograph Service Corp., Purcell, Okla., to Wichita Falls, Tex.; **James W. Vanderbeek,** geologist, Stanolind Oil & Gas Co., Casper, Wyo., to Calgary, Alta., Canada; **L. C. Achilles,** chemist, Husky Refining Co., Cody to Thermopolis, Wyo.

DEATHS

Dr. Charles Newton Gould, 81, known as the "father of Oklahoma geology," died August 13 in Norman, Okla. Founder of the University of Oklahoma school of geology and the State Geological Survey, Dr. Gould was credited with discovering many of the state's oil and gas fields. A native of Ohio, he moved to Kansas when 19. He received his bachelor's degree in geology in 1899 from Southwestern College, Winfield, Kans., and his master's degree from University of Nebraska. He was called to the University of Oklahoma to establish a school of geology, and he also began work with the Territorial Geological and Natural History Survey.

Sam Sitrin, 67, Tulsa, secretary-treasurer of United Oil & Gas Co., died August 11. He was a native of Poland.

Douglas Durell Monroe, 48, assistant general sales manager, The Texas Co., New York, died August 14 in Baltimore. He had been with the company more than 25 years.

Henry Graham Martin, 57, assistant secretary of Standard Oil Co. (N. J.), died August 14 in New York.

Dwight H. Fortine, chief geologist in California for Barnsdall Oil Co., died August 3 in Glendale, Calif.

John Francis Carmody, 85, pioneer in gas drilling in western Ontario, died at Brantford, Ont., Canada, August 7.

Jack McGrew Kavanaugh, 26, chemist, and **Keith W. Robinson,** 23, physicist, both with Monsanto Chemical Co., Texas City, Tex., were killed in an airplane crash August 7.

Clarence A. Eames, 68, former vice president of Imperial Oil, Ltd., died in Toronto, Ont., Canada, August 5. He joined Standard Oil Co. (N. J.) in 1898 as junior clerk, and later became New York representative of Anglo-American Oil Co., London. He joined Imperial in 1921 and became vice president in 1933. He was also a director of International Petroleum Co.

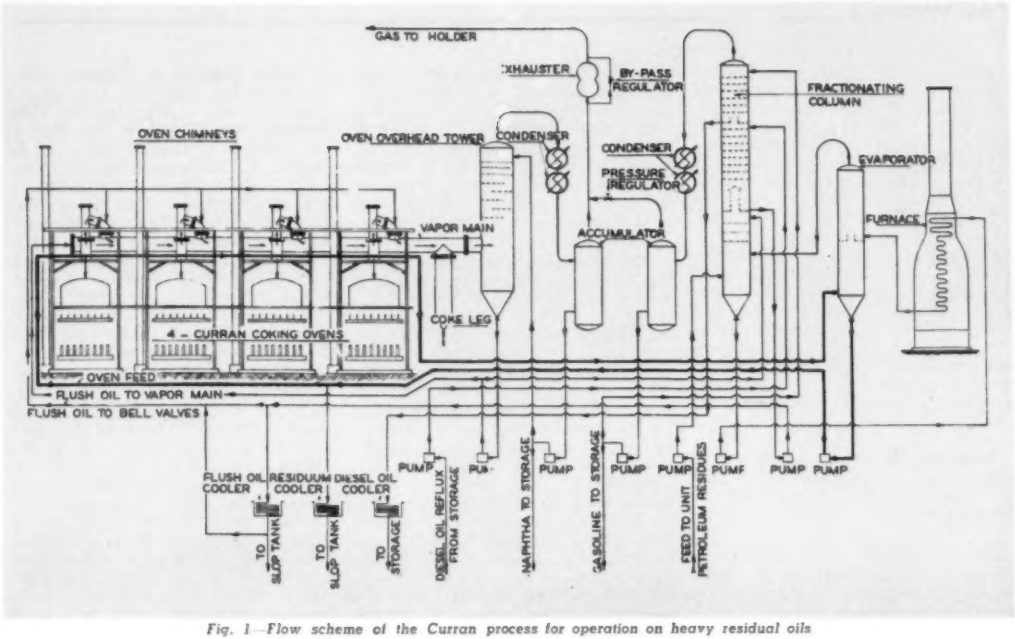


Fig. 1—Flow scheme of the Curran process for operation on heavy residual oils

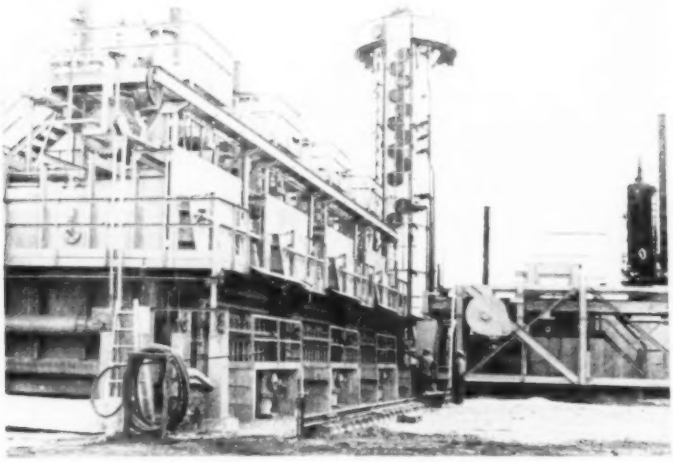
Equipment and Processes for

REDUCING PETROLEUM RESIDUES

to High-Quality

Solid Coke

by M. D. Curran*



In this view of the oven-type coking unit, the ovens may be seen on right. Structure in left foreground is a part of the coke-removing equipment

THE petroleum-refining industry has always been faced with two particular problems in disposing of heavy residues by coking. The first of these is the problem of removing the coke from the coking chamber or still, at a reasonable cost; the second is the disposal of the coke product which cannot be marketed in sized grades without excessive degradation. These problems are met by the Curran coking process wherein coke is removed by a pusher ram without the use of manual labor. Since carbonization takes place at high temeprature, vis. 1,600 to 2,000 F., the coke meets all the physical requirements for metallurgical, industrial, or domestic use, and is oil free.

This process is flexible and produces

*President, Curran Carbonizing & Engineering Co., St. Louis

besides industrial, metallurgical, or electrode coke, a large yield of zero-cold-test oil which may be marketed as No. 3 furnace oil, and a substantial quantity of high-quality distillate.

By virtue of the the high-temperature operation, the coke produced will contain less than 2 per cent volatile material. Due to its high percentage of carbon, it is well suited for metallurgical uses or for carbon-electrode material, where it should have at least twice the value of shell-still coke because calcining, with its consequent loss and expense, is not required.

Description of Process

The Curran coking process shown in the flow diagram, Fig. 1, is designed to operate on cracked residuum heavy topped fuel oil or heavy asphaltic crudes.

Charging stock is pumped from storage into the lower section of the fractionating column. Bottoms from the fractionating column are passed through a viscosity-breaking heater and through a pressure-control valve into the evaporator, where the residuum separates from the vapors.

Overhead vapor from the evaporator passes to the fractionating column where gas and gasoline are removed overhead. Fuel oil is removed as a side cut. The recycle material drops to the bottom to reenter the circuit. Gasoline is delivered into the pressure-distillate receiver from which it is pumped to reflux and to storage. Gas from the receiver is sent to the plant fuel system or to an absorption tower for additional gasoline recovery.

Heavy residue produced in the evaporator is pumped to the ovens where it is converted to coke, recycle material, and gas. The vapor from the ovens pass into another tower where a naphtha cut is taken overhead and pumped to reflux and storage to be blended with the charging stock to the viscosity breaker. The bottoms from this tower are returned to the fractionating column to be further processed.

An alternate flow arrangement is shown in Fig. 2, wherein the oven overhead tower and the fractionator are replaced by a column of sufficient size and capacity to handle all gas. This arrangement is adaptable to existing facilities where a vis-breaking furnace is included and where close cuts on the products are not necessary.

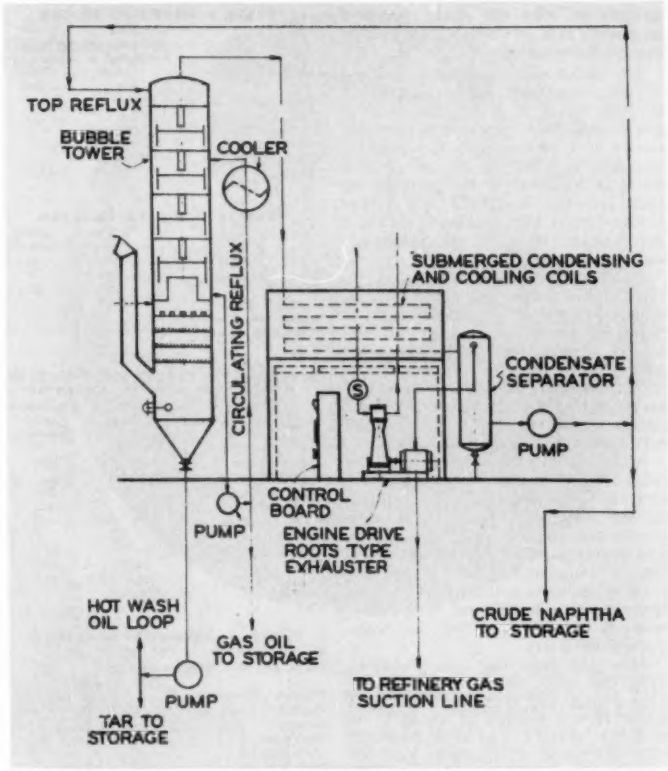
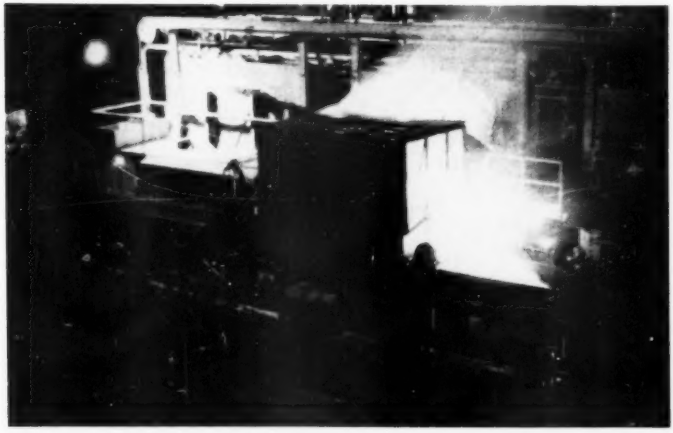


Fig. 2—An alternate flow arrangement of the Curran coking process. Here the vapor main from the ovens is connected into the fractionator



Here coke is being delivered into hopper cars by the pusher ram

Most important of the features in the process is the method of heat application to the floor of the coking chambers. Accurate temperature control is necessary for regulating the quality of the overhead products and the coke. The heating system employs the regenerative heat-recovery principle in a manner which permits the regenerators to serve as a heat reservoir and stabilizer. This system of heating prevents undue cooling of the oven floor during the charging period and provides uniform distribution of heat to the charge.

Experience with this heating system over a period of more than 15 years shows that the floor temperature may be held constant within plus or minus 25 F. limits. With this uniformity of heating excessive production or graphitic carbon is easily avoided, and coke does not adhere to the oven floor. Accordingly, the

charges of coke are easily removed by pusher ram and heavy floor carbon deposits eliminated.

The individual coking chamber has a refractory floor approximately 33 ft. long by 10 ft. wide. The floor is gas heated from below and is maintained at a temperature in the order of 1,800° to 2,000° F. Refractory material is installed in the form of an arch over the oven floor and all the brickwork is steel encased to avoid air leakage through the refractory material.

Ends of the ovens are sealed by removable refractory-lined doors, which are raised while the coke is being removed, then lowered and sealed with a prepared luting clay prior to beginning the next run. Vapor formed during carbonization leaves the oven through a specially designed gas offtake where cooling takes place to avoid overcracking.

After the coke has formed on the refractory floor, the doors are raised and the coke removed by a motor-driven ram or pusher. This ram travels the entire length of the oven and discharges the incandescent coke into a conveyor, which delivers it to a quenching station where it is sprayed with water and then delivered to another location to steam quench until dry.

After the coke has been removed from the oven, the pusher is withdrawn and the doors lowered and luted. Heavy residue of about 0° to 2° A.P.I. gravity, and at a temperature of 750° F., is charged into the oven with the rate of feeding so regulated that the temperature in the vapor space does not fall below 850° F. When sufficient oil has been charged so that the thickness of the coke bed will be between 6 and 8 in. charging is stopped and coking is started.

Charging time will vary between 1½ and 3 hours, and subsequent drying time will be between 2½ and 4 hours. At the end of the coking cycle the temperature in the vapor space immediately above the coke bed rises to a temperature between 1,100° and 1,200° F.

This temperature assures removal of volatile matter from the coke. At this point an atmospheric vent valve is opened and the remaining vapors allowed to escape. The doors are then raised and the pusher removes the coke to end a cycle. The complete oven cycle varies from 6 to 8 hours according to the character of the charging stock and the kind of coke desired.

During the early portion of the coking cycle, considerable volumes of gas oil vapors are formed and as the coking operation proceeds the total volume of vapors decrease until at the end of each cycle, only small amounts of fixed gas are formed. The vapor standpipes of a battery of ovens are connected to a common vapor main, which discharges into the fractionating tower. Since individual oven cycles are uniformly spaced the total vapor overhead to the tower is maintained substantially uniform, both in volume and composition.

The coking plant, as outlined here, when operating in conjunction with a viscosity breaker on cracked residuum from Mid-Continent crude, is capable of producing 65 to 67 per cent liquid overhead products, 20-25 per cent of hard coke with less than 2 per cent of volatile matter, and between 8 and 12 per cent dry gas.

An analysis of the charging stock and product yields for a typical operation of the Curran coking process is given in the accompanying tables.

TABLE 1—CHARGING STOCKS

	Cracked residuum to fractionator	Oven feed from evaporator
A.P.I. gravity	10.00	2.1
I.b.p. °F.	426	476
Flash, open cup, °F.	335	.
Fire, open cup, °F.	380	.
Flash, (PM), °F.	295	.
Pour, °F.	30	.
Viscosity (Furol 122° F.), Sec.	175	3,727

TABLE 2—GASOLINE ANALYSIS

	Without absorber	With absorber
A.P.I. gravity	54.2	74.2
I.b.p., °F.	159	70
E.p., °F.	368	324
Octane clear	63	
Sulfur wt., per cent	.04	
Gum, mg.	5	

TABLE 3—OVEN LIQUID AND FRACTIONATOR SIDE-STREAM ANALYSIS

	No. 3 furnace oil from fractionator	Condensed oven overhead
A.P.I. gravity	28.6	8.7
I.b.p., °F.	159	344
E.p., °F.	678	.
Flash, °F	165	200
Fire, °F.	180	275
Pour, °F	0 (Below)	45
Carbon residue %	.40	
Viscosity, (100° F. S.U.) Sec.	36.2	652
Analine point	114	
Color	Black	

TABLE 4—OVEN-COKE ANALYSIS

Specific gravity — .765
B.t.u. per cu. ft. — 1,390

	Mol per cent
Carbon monoxide	None
Carbon dioxide	None
Oxygen	Trace
Hydrogen	10.9
Methane	59.3
Ethylene	2.2
Ethane	11.6
Propylene	2.5
Propane	4.4
Butenes	1.8
Butane	1.9
Pentanes and heavier	5.4
Total unsaturates (not including pentanes)	6.5
Total unsaturates (based on pentanes as 50 per cent unsaturated)	9.2
Unsaturates by fractions	
Ethane fraction	16.0
Propane fraction	36.3
Butane fraction	48.6
Pentane (estimated)	50.0

TABLE 5—OVEN-COKE ANALYSIS

	Per cent
Volatile	1.15
Fixed carbon	97.85
Ash	1.00
Sulfur	1.09
Moisture	1 to 2

TABLE 6—YIELDS

	With absorber	Without absorber
Gasoline	11.70*	7.22*
No. 3 oil	53.10	53.10
Coke	25.60	25.60
Wet gas		13.17
Dry gas	8.80	
Loss	0.70	0.91

*All values reduced to per cent of charge basis.

Pilot-Plant Operations

Extensive pilot-plant investigation has shown that natural asphalts such as Gilsonite and Asphaltite can be processed to yield about 30 per cent coke and from 3 to 4 bbl. of oil per ton of charge. Processing equipment can be substantially the same as for refinery residues, the only additional apparatus required being equipment to liquefy the material so that it can be pumped. Rock asphalts containing substantial amounts of ash may be treated for removal of the ash material before processing so that coke ash content meets specifications.

The oven equipment employed in pilot-plant testing of various petroleum-base materials is about one-tenth the size of and identical in design with a commercial-scale unit. All auxiliary equipment, including gas washers, coolers, and similar items are designed to permit testing work to be carried on under substantially the same conditions as those prevailing in a commercial plant.

The sample, either liquid or solid, is first distilled in the shell-type laboratory still to remove the lower-boiling oils prior to charging to the oven. The hot pitch remaining in the still is pumped into the oven at a controlled rate where it can be treated at any desired temperature in the range of 1,200° to 2,000° F. About 1 ton of sample is used for a test charge. Generally a series of test runs is needed to establish conditions for commercial operations.

Operating Revenues of Gas Companies Shows Increase

Operating revenues of natural-gas companies reporting to Federal Power Commission totaled $72,530,448 in May, an increase of 11 per cent over the $65,362,839 reported for the same month a year ago, FPC reported.

Gas-utility operating income for May 1949 amounted to $10,764,906, up 3.4 per cent from the $10,407,902 reported for May 1948. Net income for the month was $9,873,329 compared to $10,097,852 reported in May 1948.

Sales to ultimate consumers in May 1949 were 120,852,000,000 cu. ft., an increase of 4.7 per cent over May 1948. Sales to residential consumers increased 7.5 per cent and to commercial and industrial consumers 9.1 per cent and 2.3 per cent respectively. Revenues from sales to ultimate consumers increased 7.4 per cent and amounted to $35,606,205.

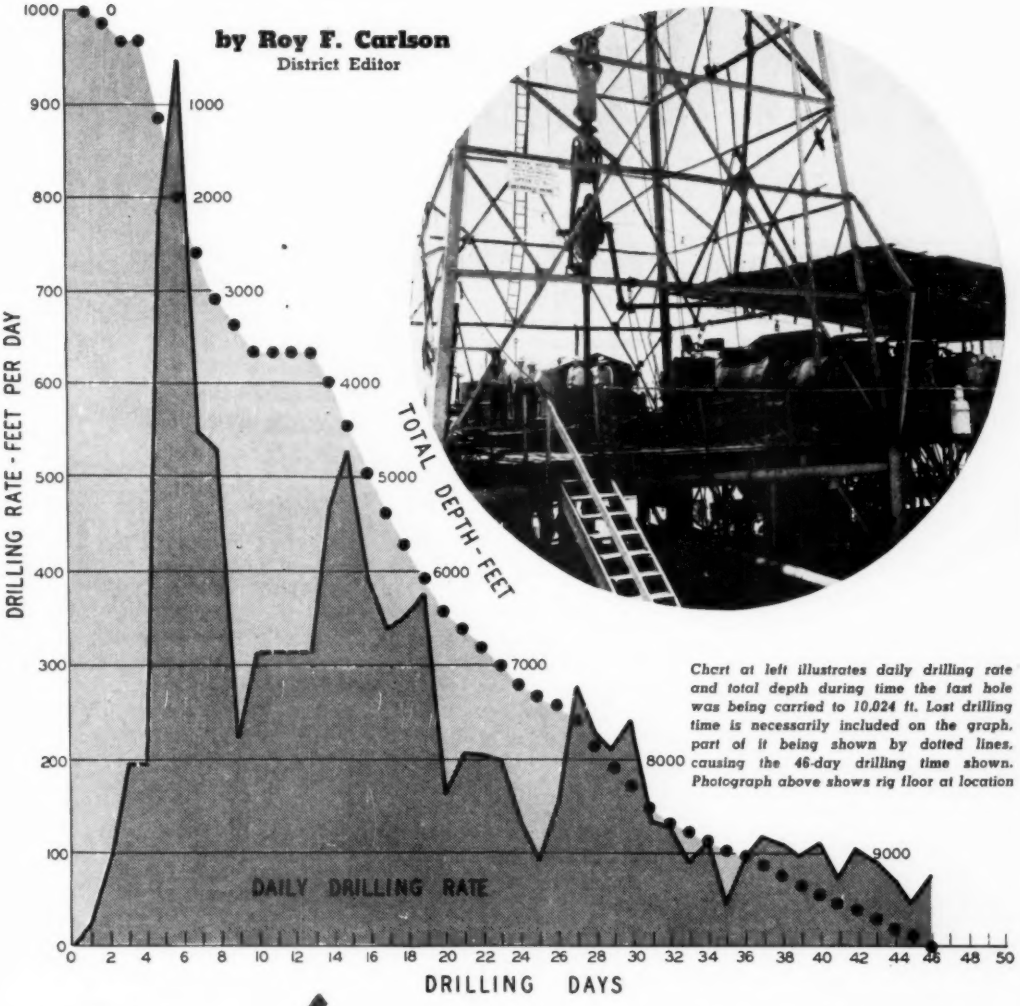


Chart at left illustrates daily drilling rate and total depth during time the last hole was being carried to 10,024 ft. Lost drilling time is necessarily included on the graph, part of it being shown by dotted lines, causing the 46-day drilling time shown. Photograph above shows rig floor at location

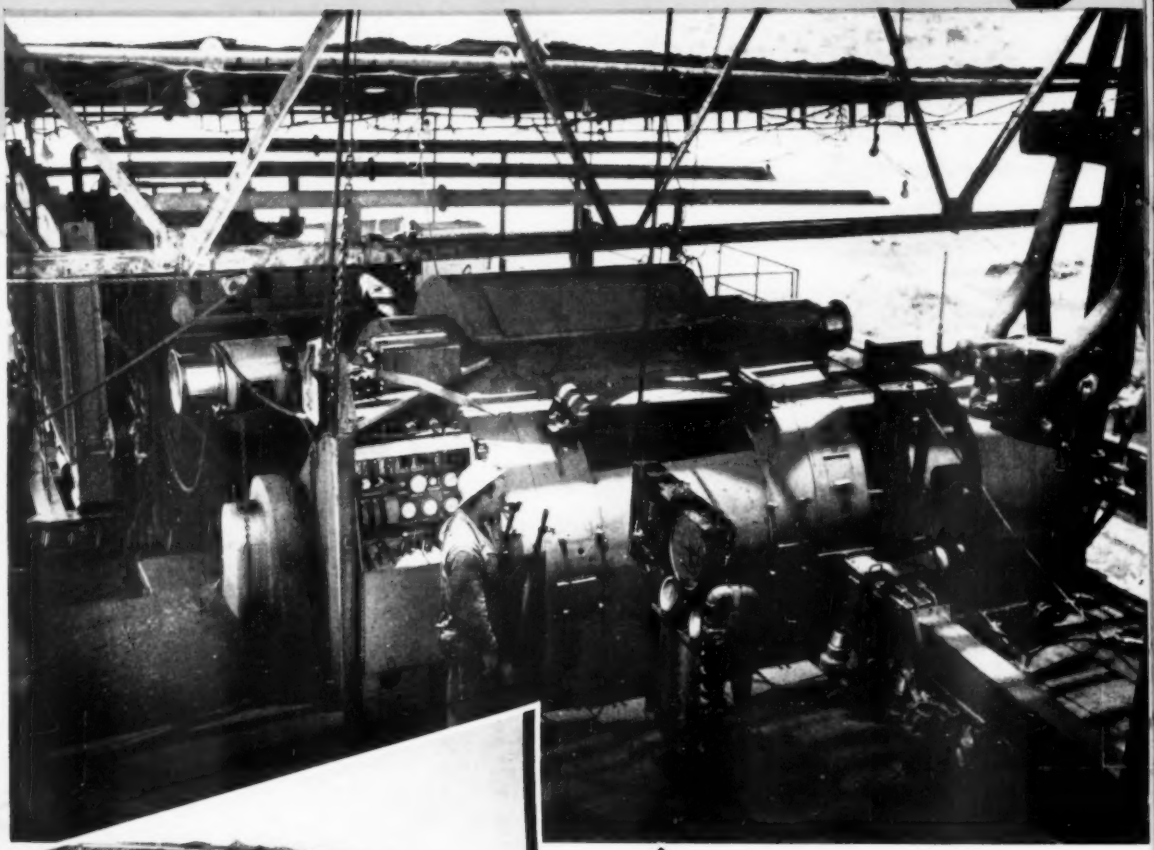
38-day—10,000-ft. DRILLING RECORD IN WEST TEXAS

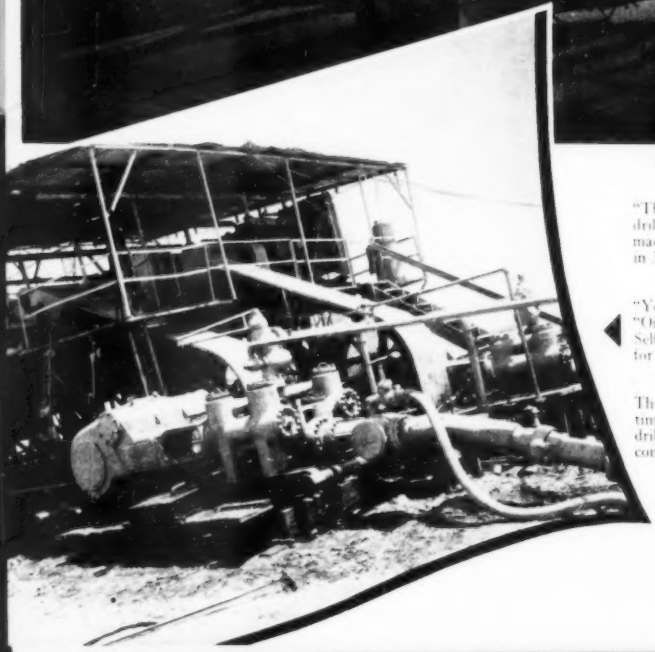
ONLY 38 days' and 3 hours' drilling time—or an over-all average of more than 260 ft. per day for the first 10,024 ft. of hole in a Benedum field well may well be record drilling speed for the West Texas area. This well, spudded on April 9, 1949, was drilling at 10,024 ft. on May 25. Since that time 7-in. casing has been run and cemented at 11,525 ft. and completion operations begun.

Total elapsed time for drilling the well to 10,024 ft. was 1,128 hours, figured on a total complete day basis. Actual drilling to 10,024 ft., with time for three drill-stem tests, using 39¼ hours, deducted and minus 23 hours of rigging up at the beginning of drilling, 129 hours for running casing and waiting on cement, and 21¾ hours used in combating lost circulation and fishing, subtracted from this total, was done in the remarkable time of 38 days 3 hours.

The fast well is a partnership proposition with Warren Wright, famed owner of Calument Farms racing

West Texas Drilling





"Oilwell" No. 96 Draw Works with Triple Engine Drive

"This is by far the best rig I've ever used," said Sam Squyres, driller. "It's faster going in and coming out of the hole. We made a round trip at 6,300 feet in 2 hours, and at 7,295 feet in $3\frac{1}{2}$ hours."

"Oilwell" No. 220-P and No. 18-P Slush Pumps

"You're just wasting your time and money if you don't use "Oilwell" Pumps equipped with DI-HARD Liners," says Max Selt, toolpusher. "We've used one set of DI-HARD Liners for 24,000 feet and they're not worn out yet."

The "Oilwell" Brantly Rotary Feed Control

This equipment paid for itself two or three times in drilling time saved. It keeps the bit on the bottom for maximum drilling efficiency even when the driller steps away from the controls for a few minutes.

"Oilwell" companion equipment to the No. 96 Rig

No. 220-P Power Slush Pumps
No. 500 or 580 Crown Block
No. 400 or 480 Streamline Traveling Block
No. 500-D Swivel (400-ton capacity)
21-A Super Speed or $27\frac{1}{2}$-B Rotaries
Brantly Rotary Feed Control

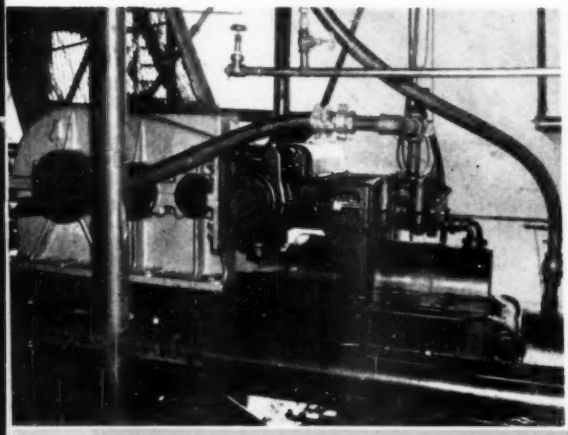
Records Broken by "OILWELL" No. 96 Rig

...drills 10,024 feet in 38⅛ days in Benedum Field, Upton County

All fast drilling records in the Benedum Field, West Texas, were recently broken when an "Oilwell" No. 96 Rig on the Warren Wright-W. C. Chancellor No. 1 well drilled 10,024 feet in the official time (less tests and waiting for cement) of 38 days and 3 hours.

This is 19 days faster than the next best time reported in the area, which was 57 days for 10,000 feet. A majority of wells in the field take around 62 days. This means the new record beat the average by almost 40%.

How do the rig operators account for this great increase in drilling speed? Mr. Herman Aweas, general drilling superintendent for Helmerich and Payne, drilling contractors, says, "We have the best men we could find anywhere. They deserve a lot of credit. Then we backed them up with the best drilling equipment we could buy. Good men, good equipment and good luck make a combination that's hard to beat."



How they did it

The Chancellor No. 1 well was spudded-in April 10, 1949, using an "Oilwell" No. 96 Rig which had already drilled three deep wells in fast time.

It was tough going from the very start with shale, limestone, rock and chert all the way down. At 10,024 feet, 73 rock bits had been used.

4½-inch drill pipe was used in the well. In keeping with West Texas drilling practices, 21 6¼-inch drill collars, weighing approximately 60,000 lbs. were used.

With the responsive power of the "Oilwell" No. 96, only eight lines had to be strung in the blocks; permitting the establishment of a highly favorable ratio between round-trip time and total drilling time.

Of course, the "Oilwell" No. 220-P Power Slush Pump contributed to this speed record by providing abundant mud circulation at desired pressures.

What's more, the "Oilwell" Brantly Rotary Feed Control kept the feed smooth and constant at all times, probably saving as much time as any other one piece of equipment.

The well is a producer and was finally bottomed at 11,525 feet.

When you can save weeks of drilling time, you save thousands of dollars, too! That's why so many drilling contractors choose "Oilwell" equipment in preference to any other. "Oilwell" equipment is engineered to work together and "Oilwell" Field Service Engineers are on the job constantly to help you keep it running at top efficiency. Next time buy "Oilwell".

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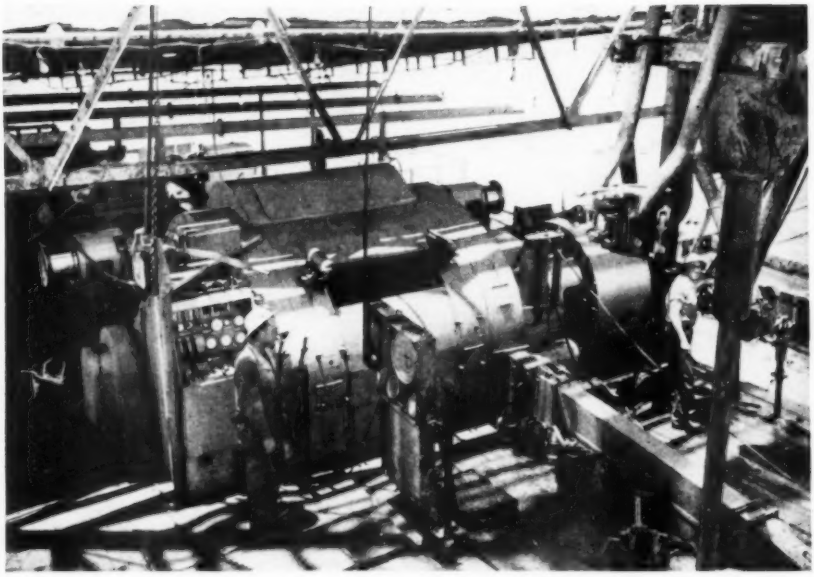
USS "OILWELL"

UNITED STATES STEEL



Left: The draw works illustrated is designed for drilling to 15,000 ft. with 4½-in. drill pipe. It is equipped with a dynamatic brake

Below: High drilling speed was helped by use of an automatic drilling control, the power unit of which is shown here. The unit utilizes hydraulic power transmission

Bottom: Supervisory and field personnel of Helmerich & Payne, Inc., including E. L. Eppinger, district superintendent; S. M. Squyres, driller; C. W. Chancellor, land owner; Herman Aweas, drilling superintendent; and Max Self, tool pusher

stables, and C. W. Chancellor, Midland, Tex., participating as coowners. The well is located in the NE SE of Section 5, A. W. Daugherty Survey, in Upton County, Texas, near the Reagan County line. It is on the southwest side of Benedum field, and is being drilled by Helmerich & Payne, Inc., drilling contractors of Tulsa, to the Ellenburger dolomite.

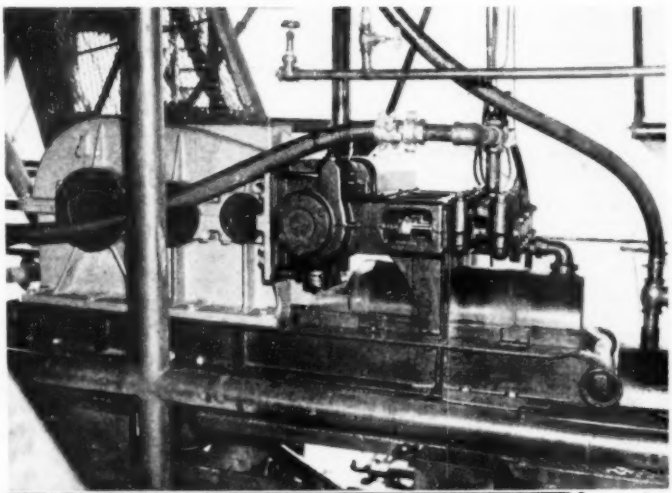
A 17¼-in. hole was drilled from the surface to 307 ft., where conductor pipe was set. Thirteen and three-eighth-inch casing was cemented at this depth with 300 sacks of cement. A 12¼-in. hole was drilled below this point to 3,660 ft., and 9⅝-in. casing cemented at 3,650 ft. with 2,000 sacks of cement. An 8¾-in. hole is being cut below this casing point.

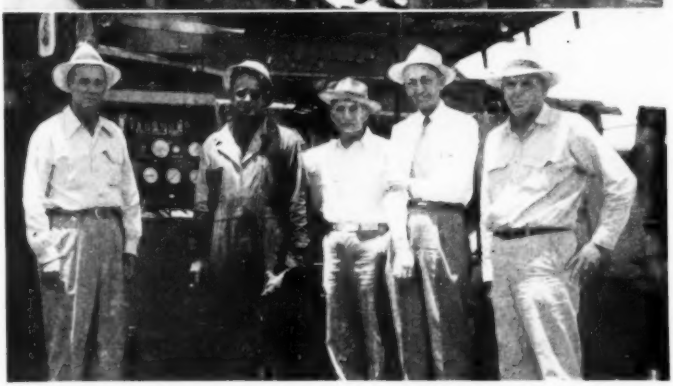
Bit Program

A total of 73 bits was used to drill the hole below the surface pipe. Of these, 60 were 8¾-in., used in drilling from 3,660 to 10,024 ft. and 13 were 12¼-in., for drilling from below the surface pipe to 3,660 ft.

Obviously, the hole has been free of trouble from fishing and other common drilling difficulties. Some loss of returns was experienced at a little over 8,000 ft. but was quickly corrected with use of fibrous lost-circulation material, and control of mud properties.

Commercial dry muds were not used in drilling the well until the time that returns were lost, water being used for the mud base. However, when the lost-circulation zone was reached, prepared clays, fibrous material, antianhydrite material, and tannates were mixed into the mud. At this point, 9.3-lb. mud was in use, having a funnel viscosity of 30 to 34 seconds.





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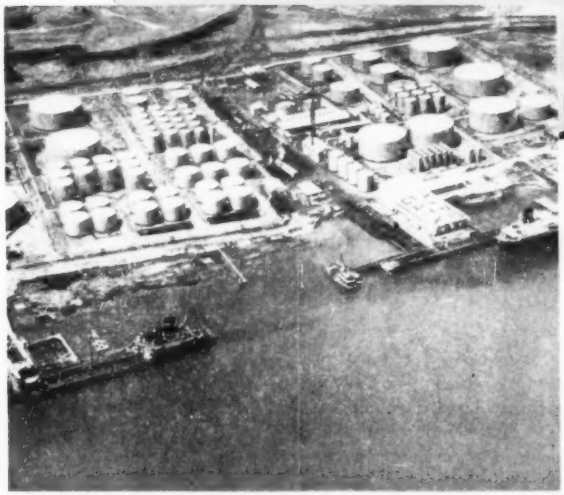

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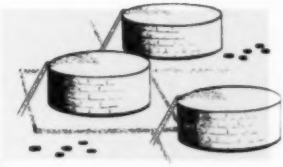

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Mud weight was increased with depth, and at the 10,000-ft. depth the mud weighed 9.7 lb. per gallon, had a water loss of 13.6 cc., a filter cake of 2/32 in., and a pH of 8.5. Viscosity at this depth ran from 40 to 45 seconds.

The hole to the intermediate casing point was drilled with ten or eleven 8-in. drill collars on the drill pipe. To the 10,000-ft. depth, 4½-in. drill pipe was used, and 21 drill collars were carried in the string.

Comparative Wells

By way of comparison, another well in the field drilled earlier by the same drilling contractor, the 1 Max Pray, required 80 days to be drilled to 10,002 ft. Six days of rigging-up time are included in this total as is time waiting on cement and running casing, with a net drilling day total of 69½ days. Another well in the field drilled by Helmerich & Payne, the 1 Ringo, required 61 days to 10,023 ft. Net drilling time for the Ringo well was 50½ days.

The Max Pray well required 39 days to 6,165 ft. as compared to 26 days in the Ringo well, and a little less than 20 days in the fast Chancellor well. The record well was drilled to 3,660 ft. in 10 days, the Max Pray well to 3,600 ft. in 14 days, and the Ringo well to 3,592 ft. in 10 days. These figures include time for running casing, waiting on cement, etc.

To achieve this rapid drilling rate in the notably difficult drilling in the West Texas area, the Helmerich & Payne tool pusher, M. E. Self, made a thorough investigation of drilling problems in the field and chose equipment and designed drilling techniques especially to meet these problems. Drillers operating the rig to reach the record speed are R. L. Barnes, S. M. Squires, and Buck Watts. Texas district superintendent for Helmerich & Payne is E. L. Eppinger, and drilling superintendent for the company is Herman Aweas.

The rig in use on the Chancellor well includes an 800,000-lb. derrick, 136-ft. high, with a 30-ft. base. The Oilwell No. 96 double-drum draw works is rated for drilling to 15,000 ft. with 4½-in. drill pipe or to 18,000 ft. with 3½-in. drill pipe. The two Oilwell mud pumps on the rig are 7¼ by 18-in. and 8 by 20 in. The rig is powered by a 1,000-hp. triple-engine drive group, compounded by a chain drive and air-clutch assembly.

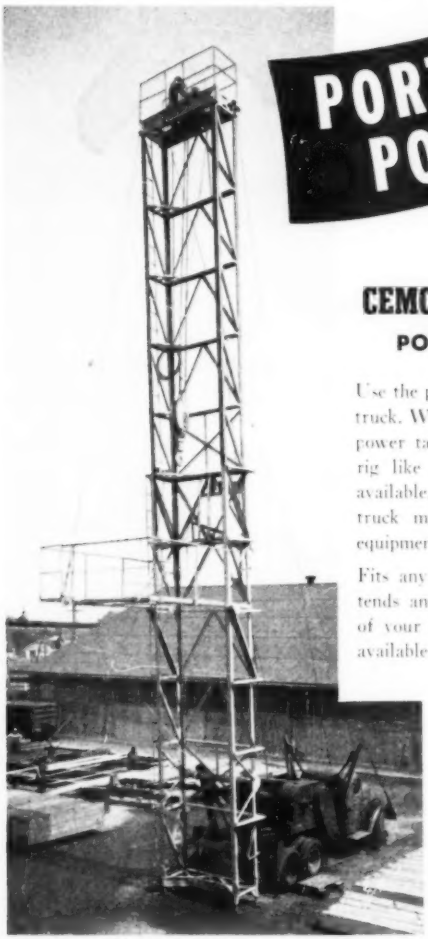
The rig also features an automatic hydraulically operated drilling control, which is undoubtedly responsible for some of the record drilling speed. The control mechanism consists of a specially designed six-cylinder pump, driven by the weight of the drill pipe after being transformed into torque on the draw-works drum shaft. A series of needle valves at the driller's position regulates the rate of discharge from the pump through a recirculation line. Through this battery of valves, the driller automatically controls the rate of feedoff; thus maintaining exact and uniform weight on the bit.

Another of the mechanical features of the rig which aids in speeding the drilling of the well is the application of pneumatic controls wherever possible. A dynamatic brake has been fitted on the draw works for more rapid and positive operation of the rig. Clutches between the engines and the compound assembly are air operated from the driller's position at the draw-works controls, further simplifying and speeding operations of the rig.

New Unloading Wharf

A new wharf for unloading tankers is being installed by Socony-Vacuum Oil Co., Inc., at its bulk terminal on the Hudson River at Albany and is scheduled for completion about the middle of September. In addition, the river bed is being dredged to 27 ft. at the wharf to facilitate the tankers' movements.

The new wharf will be 50 ft. long by 25 ft. wide, supported by steel pilings and surfaced with concrete, while the walkway connecting it with the shore will measure about 33 ft.



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> During 1948, nearly 40,000 new wells were drilled—almost 7000 more than the previous high of 1947! About 425,000 producing wells were in operation at the end of 1948, giving us 65% of the world's production! And last year, *for the first time*, crude oil production hit *two billion barrels!*

And it won't be luck that will keep our oil reserves ahead of the steadily broadening need. New fields will be explored. "Secondary recovery methods" will make existing fields more productive. And wells will be drilled deeper than ever before to explore oil reserves which up to now have been impossible to reach.

Since the early days of the oil industry, The National Supply Company has striven, not only to give oil men the best machinery and equipment it is possible to build, but to anticipate their problems, and to pioneer with practical answers for them.

Extremely deep drilling (today thought of in terms of 20,000 feet) is at the moment more dramatic than productive. But we know its tremendous *future* importance, and so have engineered and built equipment capable of drilling the very deep wells of tomorrow.

It is through *practical* pioneering such as this that The National Supply Company has for more than fifty years led in the development of better machinery and equipment for the oil industry, and for many other industries as well.

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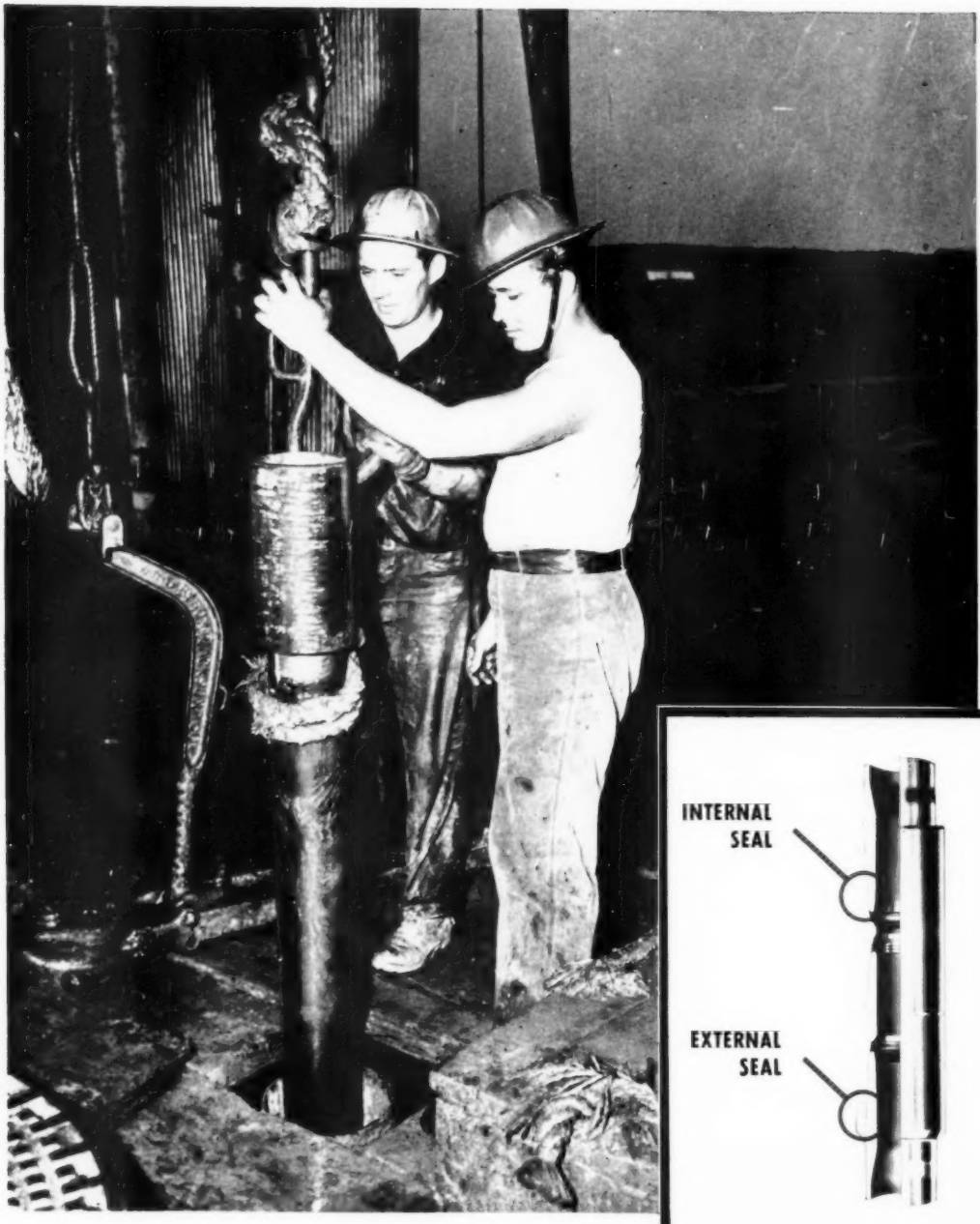

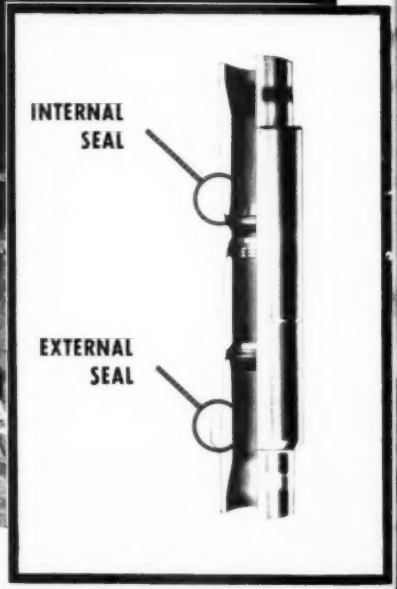

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We will be glad to call whenever it is convenient, to point out how Spang Double Seal Shrink Thread Drill Pipe and Tool Joints can save time and reduce costs.

Write for your free copy of "Spang Double Seal Shrink Thread Drill Pipe and Tool Joints". It contains 16 pages of factual information about this fine Spang Product. It also lists 23 valuable recommendations on the care of drill pipe and tool joints.

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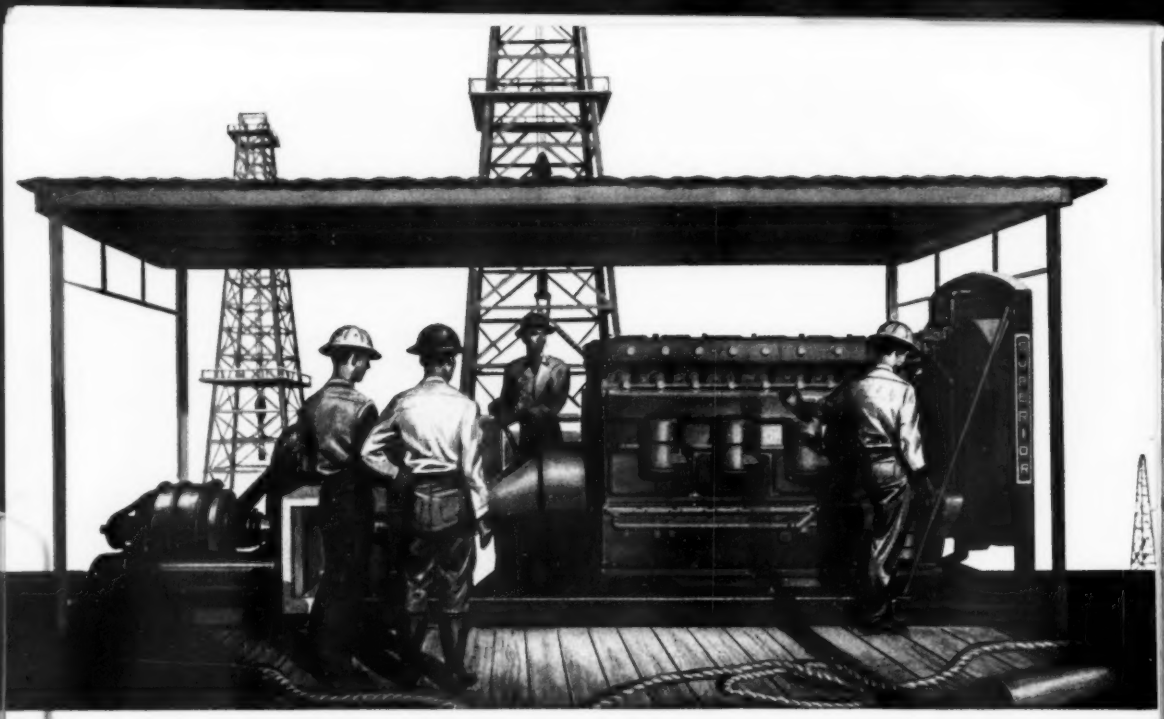

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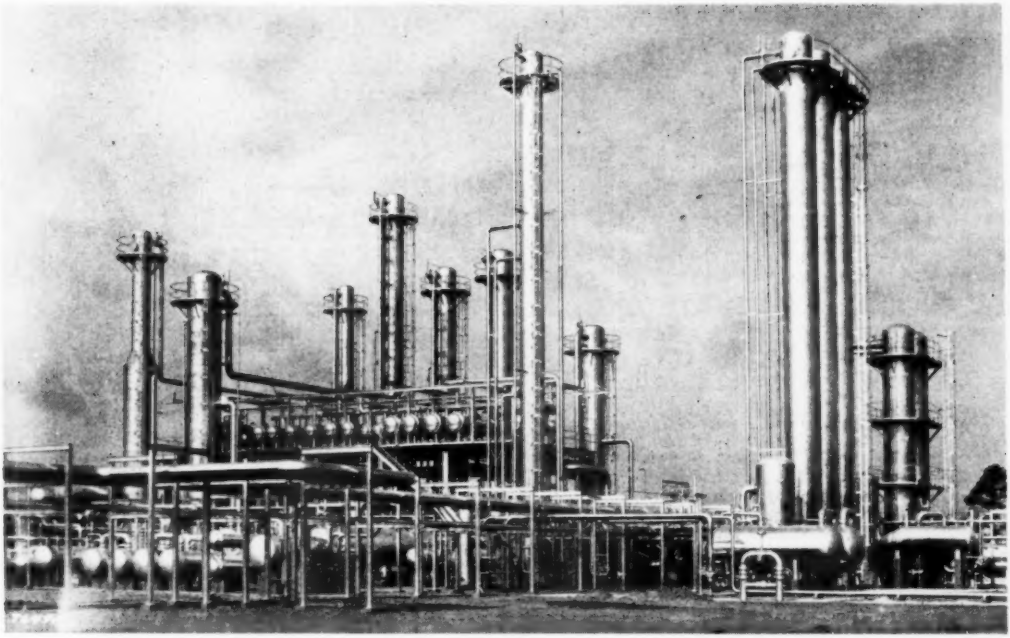


A general view of the new 90,000,000-cu.-ft.-per-day natural-gas-processing plant at Dubach, La.

Unique Design Achieves

Increased Propane Recovery

by R. F. Cox*

ONE of the latest plant projects to be completed in the natural-gas and gasoline industry's hugh expansion program has recently been placed in service by Southwest Gas Producing Co., Inc., of Monroe, La., and W. C. Feazel, of Shreveport. This plant is designed for 80 per cent propane extraction when handling 90 million standard cubic feet of gas per day, or 60 per cent propane extraction when handling 120 million cubic feet daily.

Gas from Hico-Knowles field with an average g.p.m. of 2.0 is brought into the plant through a 7.2-mile main-line system. Small-diameter lateral lines connect the individual wells to this main line. The wells supplying the plant have a flowing pressure of approximately 2,700 psig. and are produced into the gathering system thorough a horizontal meter run where the well effluent is measured at this pressure by orifice meter. Immediately downstream from the meter run, a variable choke is used to reduce the pressure to that of the main line, which is approximately 1,400 psig. At the plant a back-pressure regulator maintains 900 psig. on the absorbers.

Although the plant is conventional in many respects, it has several features which deviate from the usual design. Principal of these features is dehydration ahead of the absorbers, and the use of a low-molecular-weight lean oil combined with refrigeration to increase propane extraction.

As shown by the accompanying flow diagram, feed gas is received at the plant through the inlet surge tank. Here the gas and water-cut distillate are separated. Gas goes overhead to the fluorite-packed dehydrators and condensate plus water is drawn from the bottom. Water and condensate then flow to a water-distillate separator where water is drawn from the bottom and distillate from the top. This water-free distillate and the dehydrated gas stream are then recombined in a common header, and as a combined stream, flows through a propane-refrigerated chiller where the temperature is reduced to 60°. The stream passes from the chiller to the gas-distillate separator, where gas is separated from the distillate again. After separation, the gas enters the absorbers for stripping and the distillate, after successive flashing and separation at 425 and 160 psig. enters the process system.

Since all of this process from the initial separation to the last takes place at 900 psig., except for the incident pressure drop through the equipment, considerable load is taken off the absorbers by reducing the temperature of the combined stream to 60° F. before the final separation. In order to assure freedom from hydrate formation in the chiller, the

*District engineer, Southwest Gas Producing Co., Inc., Dubach, La.

gas dehydrators, when handling 90,000,000 cu. ft. daily, are regenerated every 12 hours. The water-distillate separator is automatic in operation and requires only routine inspection for possible mechanical failures.

By reducing the temperature of the rich gas to the absorbers to 60° F. and using an absorption oil with a 150 to 155 molecular weight, two important advantages have been gained. The first of these is the decreased amount of fixed or noncondensable gases that must be processed. At Dubach the amount of fixed gases is reduced by approximately 25 per cent when compared to plants with higher-molecular-weight oils and absorber temperatures ranging around 90° F.

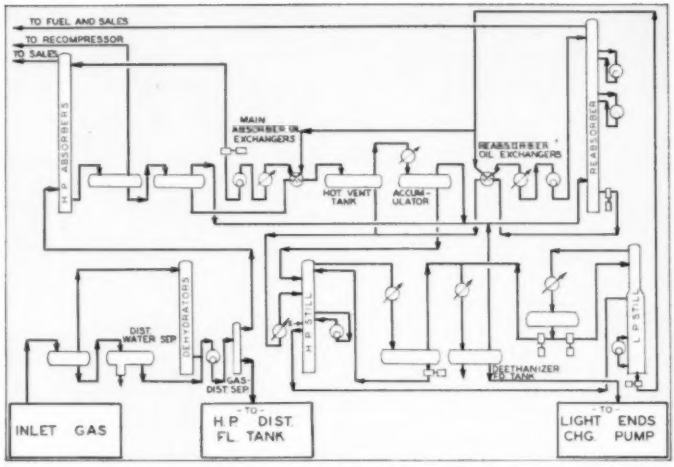
Lean Oil Required

The second advantage, and of equal importance, is the amount of lean oil required to secure the same amount of stripping as with higher-molecular-weight oils. Engineers have long recognized the possibilities of a low-molecular-weight system, but have been handicapped by excessive retrograde evaporation of the lean oil, which resulted in heavy lean-oil consumption and resultant residue-gas contamination. This probem has been overcome by the low operating temperature of the absorber. From the foregoing, it is seen that the refrigeration system is an integral part of the plant at Dubach. Also, by incorporating low-molecular-weight oil and refrigeration, the size of exchange and lean-oil stripping equipment has been reduced by approximately 50 per cent compared to a conventional design.

When the rich oil leaves the absorbers, it is flashed at 425 psig. and again at 155 psig. Gases from the first flash are recompressed and returned to the absorbers. Those of the second flash go to the low-pressure reabsorber. The oil from the 155-psig. flash flows through exchange equipment, and into a hot-oil vent tank where further flashing takes place. At this point, essentially all of the fixed gases are removed and the rich oil is fed to a still operating at 150 psig. Steam is used directly for stripping the oil of its lighter components.

Bottoms from high-pressure still are fed to a low-pressure still operating at atmospheric pressure for stripping the oil of heavier components. Here again the low-molecular-weight oil plays an important part, for this secondary stripping can be accomplished at a temperature of 410-415° F., where a heavier oil would require considerably higher temperatures. Furthermore, this temperature combined with the low pressure of the low-pressure still is sufficient to remove all water remaining in the oil from the stripping steam used in the primary still.

The hot lean oil from the bottom of the low-pressure still is picked up by pump and returned as a split

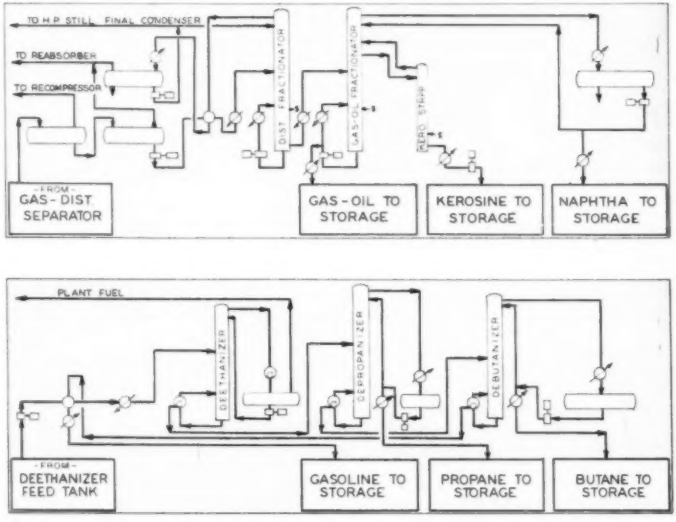


Process flow scheme in absorption and distillation section of the new plant

stream through the exchange equipment and chillers to the low-pressure reabsorber and to the high-pressure absorbers. Interstage chillers are employed on the low-pressure reabsorber to increase efficiency.

The distillate, after being subjected to the same flash stages as the rich oil, is fed to a distillate fractionator. Gases from the flashing process are combined with gases from the respective rich-oil flashes. The distillate fractionator functions to remove gasoline and lighter components from the distillate. Bottoms from this column are fed to the gas-oil fractionator where a naphtha cut is taken overhead, kerosine as a side cut, and gas-oil from the bottom. Gasoline and lighter components from the distillate fractionator overhead are combined with the overhead products from the high-pressure and low-pressure stills, in the deethanizer surge tank. Material from this tank is fed by pump to the deethanizer, operating at 455 psig. where ethane is removed. Condensation of the overhead product from this column to be used for reflux is accomplished by a propane-refrigerated chiller.

The deethanizer bottom is fed to a depropanizer, operating at 240 psig. where 99 per cent pure propane is



Flow arrangement (above) employed in the distillate fractionating section, and below, arrangement of the light-ends fractionating section of the 120,000,000-cu.-ft.-per-day natural-gas processing plant

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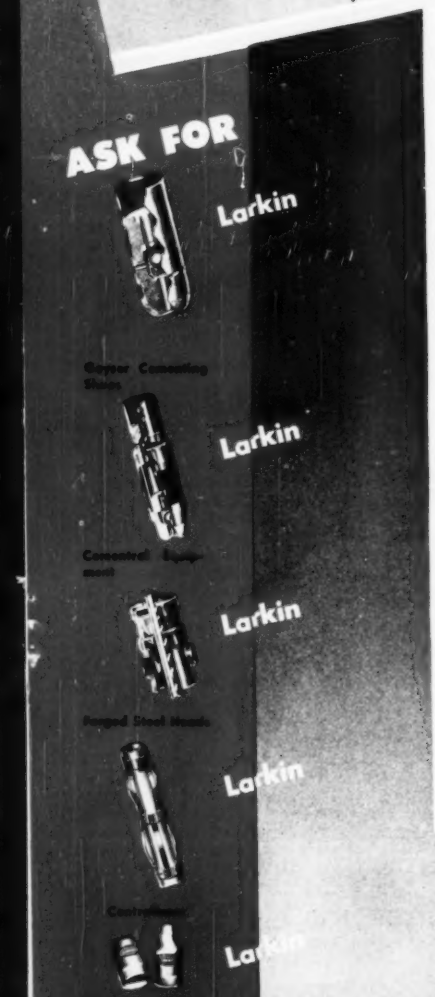

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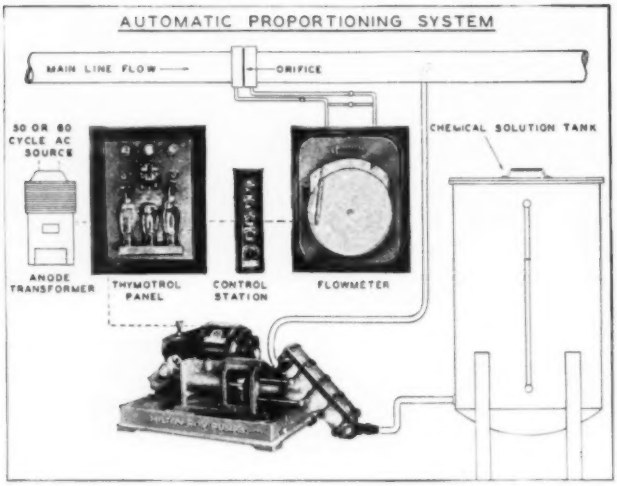

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taken off overhead. Bottoms from the depropanizer are fed to a debutanizer operating at 70 psig. where a 99 per cent pure total-butane cut is taken overhead and natural gasoline from the bottom. The natural gasoline is combined with naphtha from the gas-oil fractionator to make a 395° F-e-p motor fuel. Pressure on the deethanizer is controlled by a back-pressure regulator on the overhead accumulator residue gas. This gas, consisting predominately of ethane, is utilized as fuel at the power plant. The depropanizer and debutanizer pressures are controlled by regulating the flow of cooling water to the overhead product condensers. This method has proved to be very satisfactory for pressure control on these units.

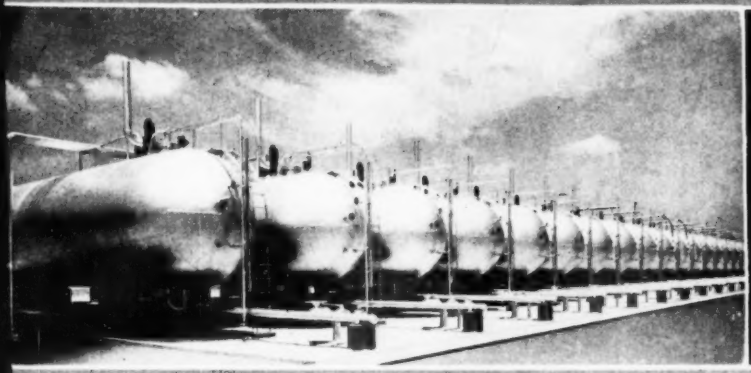
All dehydration, absorption, and fractionation facilities are arranged around a triple-decked structure. The top deck of the structure is utilized for overhead coolers and condensers. Immediately below is the accumulator deck which holds the overhead accumulators for all columns. On the ground floor, all process pumps and control instruments are housed. This compact arrangement lends itself very readily to close operator supervision with a minimum of travel in this area.

With the exception of five units, all process pumping is done with motor-driven centrifugal pumps. The high-pressure lean-oil pump, hot-lean-oil pump, deethanizer-charge pump, low-pressure still overhead booster pump, and rerun pump are steam powered; the last two of these are the only reciprocating pumps used. Standby facilities for all pumping units are provided.

Refrigeration Unit

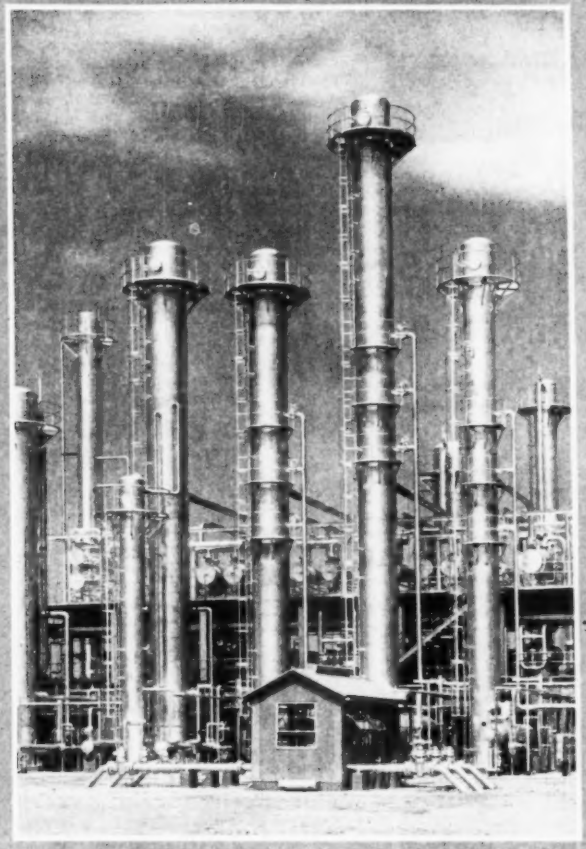
The refrigeration unit is comparable to a household unit, but of a much larger capacity. Propane is the refrigerant used, and a reservoir of the material is maintained in the propane surge tank. Various chillers employed in the plant receive liquid propane from this reserve. The evaporated propane from the chillers is picked up by the propane compressor and discharged under sufficient pressure to obtain liquefaction when the discharge is cooled to 90° F. The liquid propane is then returned to the propane surge tank to be cycled again. The compressor employed for this duty is of the centrifugal type, coupled directly to a steam turbine capable of turning 7,600 r.p.m., and rated at 1,450 b.hp.

The cooling system consists of a three-fan induced-draft cooling tower. Two separate systems result from this arrangement. Those products requiring a minimum of cooling receive 85° F. water from the cooling tower. After use, this water is dumped into the 95° F. system which further uses it for products requiring maximum cooling. It is then returned to the cooling tower. A butterfly valve is provided between the 85° and 95° F.



SOUTHWEST-FEAZEL GASOLINE PLANT

DUBACH, LOUISIANA



The Southwest-Feazel Gasoline Plant at Dubach, Louisiana, recently completed and put into operation, was designed and constructed by The Fish Engineering Corporation, Houston, for the Southwest Gas Producing Company, Inc., and W. C. Feazel.

Most of the fractionating towers and all of the twenty-four 1000 barrel storage tanks were fabricated by Beaird.

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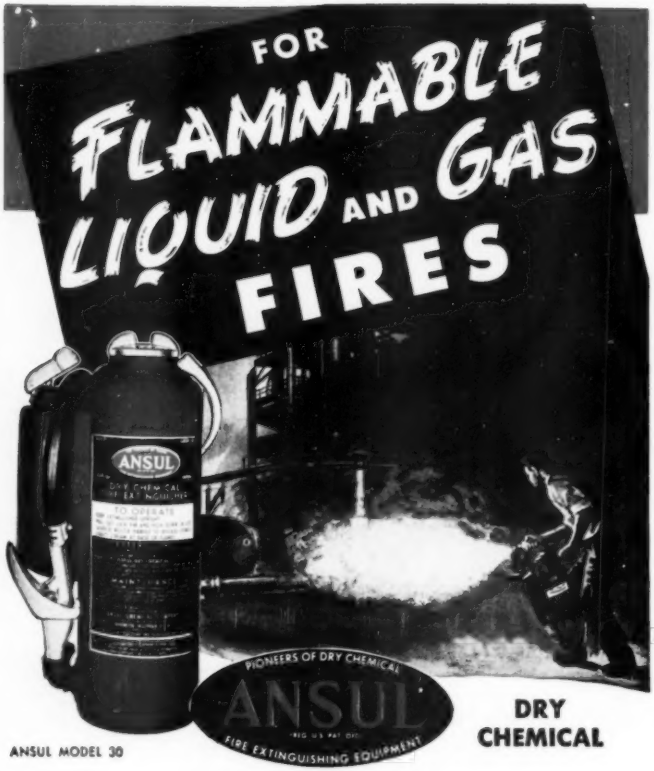

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system to assure ample supply to the second system.

The power plant consists of three boilers each capable of delivering 60,000 lb. of steam per hour, and two 700-kw. turbogenerators. The boilers are conventional water-tube type with wall-and-crown-mounted superheaters, and operate at 350 psig. Feed water is made up of returned condensate and evaporated raw water from the plant's two deep wells. The turbogenerators receive 350-psig. steam directly from the boiler steam header, and by employing steam condensers, exhaust at 28 in. of vacuum. The turbine operates at 8,600 r.p.m. The generator is coupled to the turbine by gear reduction and rotates at 1,200 r.p.m.

Since direct-fired heaters were entirely eliminated from the design of this plant, all processing is accomplished with steam. Maximum usage has been made of all exhaust and condensate. To do this, three steam systems are used. The distillate fractionator preheater and reheater, the gas-oil fractionator preheater and reheater, the regeneration gas heater, the high-pressure still preheater and reheater, and the low-pressure still reheater, all use 350-psig. steam. The condensate from these vessels flows to an accumulator on the accumulator deck of the distillation structure where it is flashed to 200 psig. The flashed steam is used to power a vertical centrifugal pump which returns the 200-psig. condensate directly to the boilers.

Stripper steam which is used in the distillate fractionator and high-pressure still comes from a 160-psig. system, which is made up from turbine exhaust and by makeup from the 350-psig. system. Steam used for stripping in the gas-oil fractionator and kerosine side stripper as well as that used for reboiler and preheater service on the light ends fractionation comes from a 50-psig. system. This system is made up of excess 160-psig. steam and from turbine exhaust.

Excess 50-psig. steam is used to evaporate the raw boiler feed water and to deaerate it. That steam not required for deaeration and evaporation is condensed by air-water cooler and dumped in the boiler feed-water tank. Raw water from plant wells is very soft but has a carbonate content above the minimum to assure freedom from corrosion at boiler temperatures. A sulfuric acid treating system is employed to reduce the carbonate content of this water. Water from the well passes through a mixing plate where acid is fed in proportionately. This water then goes to a small atmospheric cooling tower where it is aerated, liberating CO_2 but picking up some oxygen from the air. A pump takes suction from the basin of the tower and discharges through the deaerating heater where the oxygen is removed. From the deaerating heater, the water goes to

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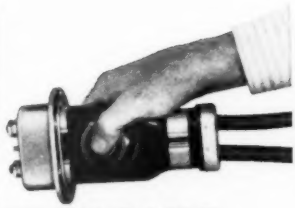

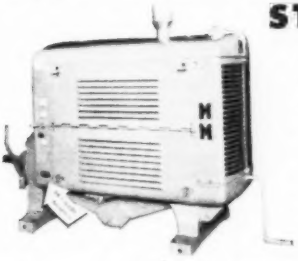

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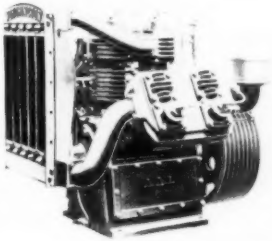

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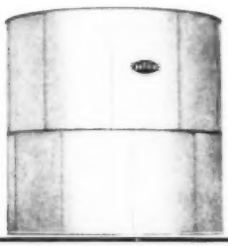

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the evaporator and thence to the boilers. All steam, condensate, and make-up are used. None is vented to atmosphere.

Provisions have been made to handle all residue and process gases at Dubach. All residue streams, except the deethanizer accumulator gas, return to the low-pressure reabsorber Some of the reabsorber residue is used for fuel. The excess flows to the suction header of two 400-hp. compressors, and is boosted to 900 psig., at which pressure it becomes a part of the residue-gas sales. As such, it is put in the sales gas-transmission line along with the high-pressure absorber residue.

Storage facilities at Dubach consist of twenty-four 1,000-bbl. pressure storage tanks for L.P.G. products, 60,000 bbl. of motor-fuel storage, 10,000 bbl. of kerosine storage, and 10,000 bbl. of gas-oil storage. Design calculation showed that at 90 M.c.f.-per-day rate to the plant and with 80 per cent propane and 100 per cent butane plus recovery, approximately 230,000 gal. per day of various products would be made. At 120 M.c.f. per day to the plant and with 60 per cent propane and 100 per cent butane plus recovery, the production would be 295,000 gal.

In conjunction with the tank farm, a tetraethyl lead blending plant is operated. Since the west side of the plant area is bounded by a railroad, the blending plant was built alongside a spur. Tetraethyl lead shipments are received by tank car and unloaded into the blending plant weight tank by conventional methods. TEL is added to the production of house-brand and premium-grade motor fuels. Blends are made either in the plant production make tank or in one of the extra storage tanks. Complete pipe-line and pump facilities are installed for transferring from one tank to another, or for circulating a tank.

The over-all operation pattern is greatly assisted by the use of short-wave radio service between plant and field cars. The Southwest Gas-Feazel system consists of two central stations and five mobile units, all of which are licensed by FCC to operate on a frequency of 153.35 megacyles.

Fish Engineering Corp. designed and constructed the Dubach plant for Southwest-Feazel.

Gas-Technology Institute Constructing New Building

Institute of Gas Technology is constructing a new building in Chicago to handle its expanded facilities for gas-industry research and education necessitated by the current expansion program of the gas industry. The building will house the institute's precision laboratories, some of its research laboratories, its educational facilities, information service, library, and administrative and business offices.

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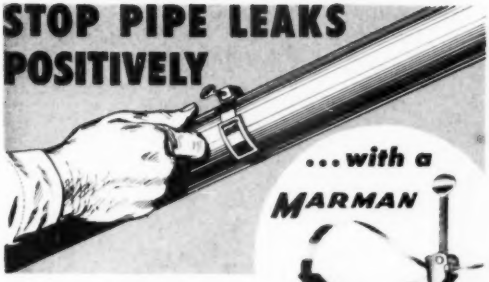

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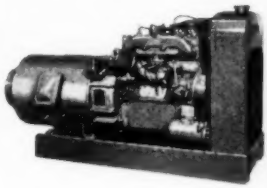

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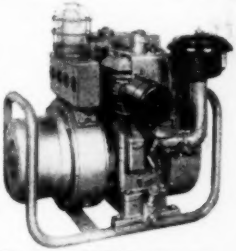

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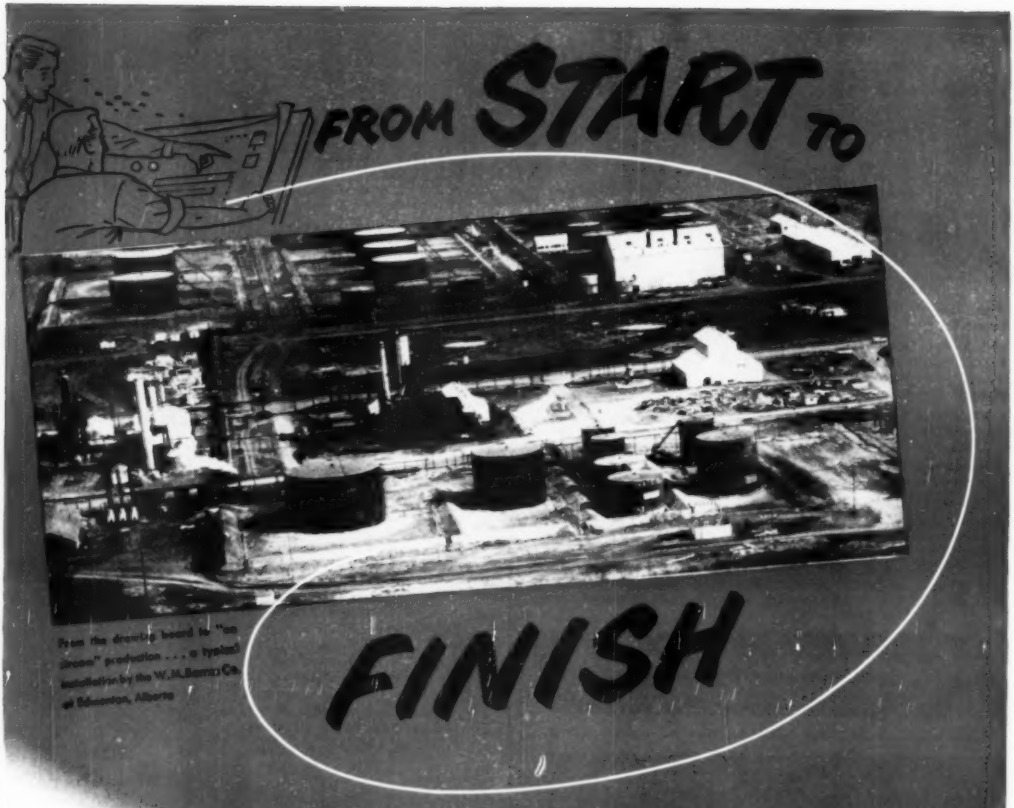

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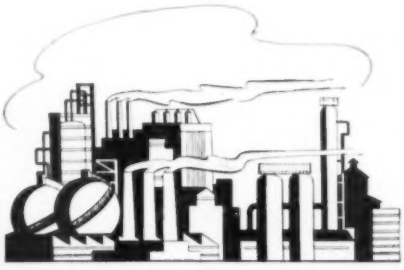

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Basal Sundance Repressuring

Photo of natural-gasoline and gas-repressuring plants at Lance Creek field

in Lance Creek Field, Niobrara County, Wyoming

by R. M. Churchwell*

LANCE CREEK oil field is located in Niobrara County, Wyoming, approximately 20 miles north of the town of Lusk, on the southeast flank of the Powder River basin. The structure lies on the west end of an anticlinal axis which extends 12 miles to the east and includes two other structures, one of which has proved an important discovery in the last few years.

Lance Creek field proper has been divided areally into two parts on the basis of structural and lithologic anomalies. The west reservoir, which is covered in this report, comprises the area west of a north-south fault which lies near the center of the structure.

During the life of Lance Creek field, six different groups of sands have been proven productive. They include the Muddy and Dakota series, the Lakota, Morrison, First Sundance, Basal Sundance, Converse, and the Leo sands.

Lance Creek was discovered in October 1918 when Ohio Oil Co. completed a well in east Lance Creek in the Dakota sand at a depth of 3,600 ft. with an initial production of 1,500 bbl. per day. By 1930, some 120 wells had been drilled to the Muddy, Lakota, or Dakota sands. Total production from these sands to date has been estimated at 4½ million barrels of oil and 45 to 50 billion cubic feet of gas with the greater part of the gas sand coming from the west part of the reservoir. These sands have been virtually depleted and the remaining producing wells are in the eastern part of the field.

The Morrison sand has a relatively small productive area on the crest of the structure. It has never been produced. Wells presently producing from deeper sands will be utilized to recover oil from this pool when they are depleted in their present status.

First Sundance pool, another small reservoir which occupies the top of the structure in the west part of the field, was discovered in 1930, but the reservoir was not actively developed or produced until 1943, when the reservoir was unitized and a participating area set up. Oil production declined rapidly from 800 to 200 bbl. daily in the fall of 1947 when gas injection was commenced in an effort to arrest the decline. During the first year of injection, oil recovery was more than 60,000 bbl. greater than that possible at the rate of production existing prior to the start of injection.

The First Converse sand, a small productive area of less than 300 acres on the top of the structure in the west part of the field, has had an effective water drive which has maintained a reservoir pressure of 1,400 psi. Consequently, recovery has been good and to date almost 800,000 bbl. of oil have been recovered from the five producing wells.

The Leo sand, which is the largest of the Lance Creek pools in area, as well as in oil production, was discovered in November 1937. Production in the west part of the field is obtained from porous sand and lime zones occurring irregularly through 550 ft. of lime, dolomite, anhydrite, and shale. An effective water drive has maintained reservoir pressure at approximately 1,600 psi. after declining from an original pressure of better than 2,000 psi. Gas injection into the west Leo reservoir was tried without apparent beneficial result. During the last year, a high-volume pumping program has been instituted and is proving very successful in the

*Division petroleum engineer, The Ohio Oil Co., Casper, Wyo. Paper presented at recent meeting of Rocky Mountain district A.P.I. Division of Production, Casper.

depletion of the reservoir. Total recoveries to date from the Leo sands has been almost 36 million barrels of oil. The production of nearly 22 billion cubic feet of gas has been an important item in the pressure-maintenance operation of the Basal Sundance sand. To date the various reservoirs in the west Lance Creek field have produced approximately 66 million barrels of oil, 155 billion cubic feet of gas, and 36 million barrels of water.

West Basal Sundance Pool

History.—The Basal Sundance sand was discovered in March 1935 when Ohio Oil Co. completed its 2 Agnes Rohlff well for an initial production of 2,000 bbl. of 47° A.P.I. gravity oil per day. In 1936, after a rapid development of the reservoir, the three major operators, Argo Oil Corp., Continental Oil Corp., and Ohio Oil, were cooperating to control production rates and investigating the possibilities of unitization in order to achieve maximum oil recovery. A unit agreement among these three companies became effective January 1, 1938.

Participation was determined on the basis of productive acreage and, while operations were continued by the original owners under the direction of a unit planning and operating committee, lifting costs and the operation of the compressor plant were adjusted among the three operators. Continental Oil built a gasoline plant to process all gas produced in the unit area. Prior to the completion of this plant all gas had been sold to a carbon-black plant.

A repressuring plant was completed in February 1938 by the unit operators and is operated by the Continental in conjunction with its gasoline plant. After unitization, residue gas, except plant, field, and camp fuel, was returned to the west Basal Sundance reservoir.

Reservoir Characteristics

The Basal Sundance reservoir is an elongated asymmetrical fold with the steep flank on the basinward side to the northwest. The maximum dip within the productive area along the northwest flank is 14° and the average dip on the southwest, south, and southeast, mid-flank is about 4½°. These dips are considerably lower than dips found in the majority of the Rocky Mountain structures. The total productive closure of the Basal Sundance sand is about 700 ft.

The formation over most of the productive area consists of two sands separated by a black or brown limestone. However, in a small area in the north and one in the west part of the field the limestone is absent. The variation in thickness of these sands runs from 0 to 58 ft. in the upper bench and 0 to 88 ft. in the lower bench.

The oil-water contact in the upper bench outlines almost 1,500 acres including 260 acres where the sand is absent, leaving a net total of 1,217 productive acres in the upper sand, and 1,354 acres in the lower sand. Core analyses indicate porosities ranging up to 34 per cent and permeabilities ranging to 1,250 md. with an average permeability of 250 md.

An oil reservoir with the above-mentioned characteristics is sufficiently interesting that a number of estimates of original oil in place have been made. No two estimates agree exactly due to differences in the basic assumptions necessary for calculation and no generally accepted figures for oil in place are available. Despite the controversy concerning this figure, its importance to the discussion warrants the inclusion of a definite value. It was decided to quote the estimate of R. D. Ferguson, assistant supervisor of the United States Geological Survey, who has been in active contact with Lance Creek field for a number of years. Ferguson's figures may or may not agree with the various operators estimates, but they are from an impartial source and might very well be as nearly correct as any figures in existence.

Before presenting the oil-in-place figures it is well to state that one of the controversial points concerning the Lance Creek Basal Sundance reservoir was the presence or absence of an original gas cap. Some of the engineers who have studied this reservoir are convinced that the existence of an original gas cap was impossible since early gas-oil-ratio performance indicated that some of the oil was undersaturated. On the other sand, Ferguson has demonstrated by material-balance calculations and Simpson's Rule of Approximation that a considerable original gas cap was present. He stafes that this gas cap occupied approximately 12 million barrels of reservoir space.

Considering the volume of the gas cap and using the acreage figures above, together with an average porosity of 20 per cent, an interstitial water content of 30 per cent, and a relative volume factor of 1.39 (determined from bottom-hole sample analyses) the tank oil in place is estimated to be approximately 48 million barrels.

Initial reservoir pressure was not measured, but has been estimated to be approximately 1,500 psig. at a +660-ft. datum. Saturation pressure for a bottom-hole sample of the oil analyzed in 1937 was 970 psia. Initial gas-oil ratios indicated varying saturation pressures and solution gas-oil-ratios, probably declining down the flanks of the structure. Reservoir temperatures are as high as 156° F., an abnormal condition for the Rocky Mountain area. There has been a very slight water encroachment during the life of the reservoir.

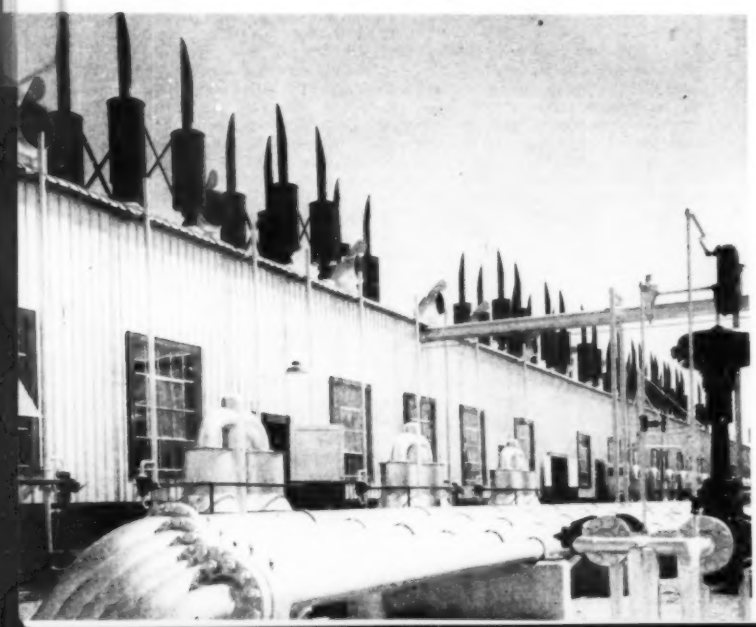
Reservcir Performance

Pressure decline of the reservoir was abrupt, until repressuring began in February 1938, falling from an original value of about 1,500 psi. to 846 psi. During this period a total of 6.6 million barrels of oil was produced, resulting in a production of more than 10,000 bbl. per psi. decline.

Gas-oil ratios higher than 10,000 cu. ft. per barrel were reached in 1937, and previous to unitization of the reservoir, the three principal operators cooperated in controlling waste of gas by voluntary proration of production. Gas production, which had exceeded 12 million cubic feet per day in 1937, was reduced to 7 million cubic feet per day in January

(Continued on page 138)

Gas-compressor building at Lance Creek, piping manifolding in foreground



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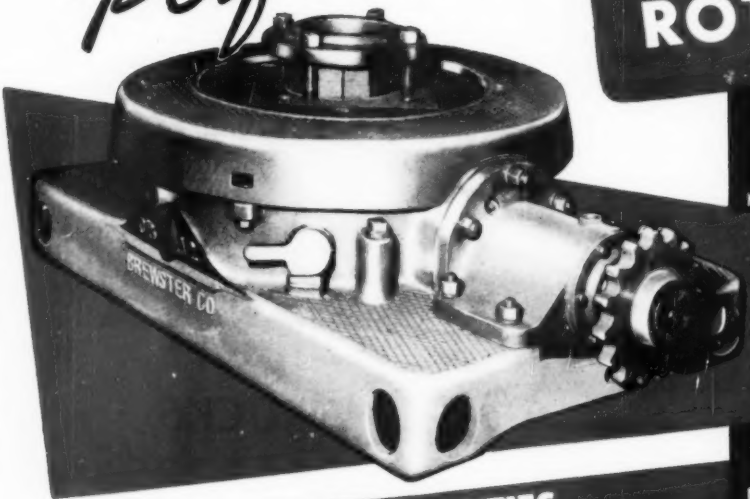

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OIL PRODUCTION IN IRAN

Wells average 10,000 bbl. per day, with some capable of producing in excess of 30,000 bbl.

by H. W. Lane, O.B.E.

This is the third and final part of an article entitled "Modern Drilling and Production Practices in the Oil Fields of South Iran," which was presented at the Fourth Empire Mining and Metallurgical Congress at London. Once the difficulties of drilling in these fields are overcome, producing the oil is relatively easy, albeit insuring maximum recovery without waste has called for a complete study of underground conditions. What has been learned from these studies is revealed here. The author is with Anglo-Iranian Oil Co., Ltd.

THE production problems in the Iranian oil fields have been the subject of many papers and articles and much of the material included here must necessarily be repetitive. Many such papers have dealt with this subject in considerable detail and, even if it came within the scope of this paper to do so, space alone would not permit such detail to be included. It is proposed, therefore, to present a broad review, paraphrasing freely from the work of those who have gone before and to whom all due acknowledgments are made.

As an introduction a condensed data sheet (Fig. 6) of the principal producing fields is shown. The production problem in these limestone fields, when compared with those generally experienced in sand fields, which supply the greater proportion of the world's production at present, cannot be said to be one of great difficulty. A comment made during the discussion which followed the reading of H. S. Gibson's paper before the A.I.M.E. in New York in 1939 referred to it as "coming close to the petroleum engineer's paradise."

It must be freely admitted that, once drilling difficulties are overcome, oil is relatively easy to produce and is available in great quantity. Wells in these fields have the highest producing rate in the world, the average over all fields being 1,250 tons per day (10,000 bbl. per day) per well while individual wells can produce as much as 4,000 tons per day. These generous donations are not, however, achieved merely by the opening of a few valves, as the same commentator went on to suggest. The control of this production, the efficient drainage of these reservoirs, and the insuring of maximum recovery without waste has called for a complete study of underground conditions and the collection and correct interpretation of an immense amount of physical data. This study is still going on and, with the discovery of new fields, new information is forthcoming, each field presenting conditions which differ in some degree from those in earlier discoveries.

Gibson, in his Redwood memorial lecture, explains the theory on which Iranian production practice is based and tells how the large numbers of wells drilled in the parent field of Masjid-i-Sulaiman enabled this basic information to be collected and the mechanism of production to be studied. This information was applied to fields subsequently developed, production practice being adapted to suit the particular problem in each field.

1. THE UNDERGROUND SYSTEM

(a) The reservoir rock.—The petroleum reservoirs in all these fields

RESERVOIR DATA SHEET

SOUTH IRAN

FIELD	DATE OF DISCOVERY	COMMENCED PRODUCTION	PRODUCING AREA SQ. MILES*	WELLS						PRESSURES					PRODUCTION		
				RECYCLE	PRODUCTION	OBSERVATION				DOME PRESSURE AT GAS OIL LEVEL PSI.	RANGE OF MINIMUM CLOSED-IN PRESSURES OF OIL WELLS	RANGE OF SATURATION PRESSURES	RANGE OF PRODUCING PRESSURES AT WELL HEAD PSI.	AVERAGE PRODUCING GAS OIL RATIO	DAILY RATE TONS PER DAY	AVERAGE PER WELL TONS PER DAY	PRODUCTION TO DATE M.T.
						OIL	GAS	OIL WATER	GAS OIL	WATER								
M.I.S.	1908	1911	54	16	29	9	2	9	1	9	415	0	430-650 at 93 F.	0-50	42	11,000	380	107 Net
HAFT KEL	1927	1929	45		23	1	1	8		4	1,175	150-650	1,200-1,500 at 100 F.	400-550	67	27,500	1,200	107
GACH SARAN	1928	1937	60		3	2	1				2,050	1,025-1,075	2,050-2,300 at 140 F.	1,000-1,100	97	5,500	1,800	12
NAFT SAFID	1934	1938	30		2	2		1	1		3,000	1,000-1,350	3,100-3,200 at 150 F.	1,000	144	1,400	700	2
AGHA JARI	1937	1939	40		10	6			1		3,150	1,550-1,800	3,450 at 164 F.	1,150-1,500	150	27,500	2,750	21
LALI	1938	1940	10		2	1		1			3,030	1,200-1,500	3,000 at 125 F.	1,400	125	1,800	900	0-5

*AS PROVED BY DRILLING AT 1 1 49

Fig. 6

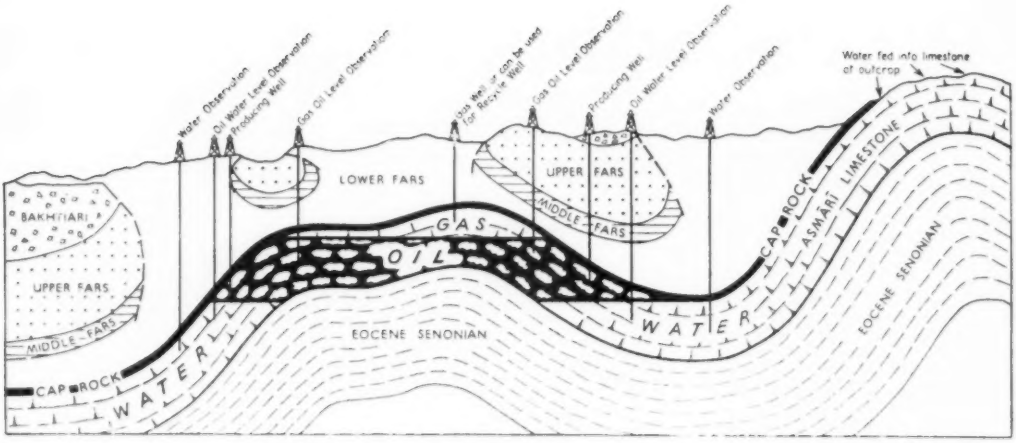

Fig. 7—Typical South Iran structure, showing types of wells in use in producing fields

are large anticlinal structures of Lower Miocene to Oligocene age and known as the Asmari limestone, the porosity of which, as far as is at present known, varies between 2 and 15 per cent, the average being about 5 per cent. Complete information is not yet available from the newer fields, but it would appear that they may be of even higher porosity. Gibson summarizes it as in Table 1.

Large accumulations of petroleum are trapped in these anticlines by salt water below and the impermeable caprock and the plastic rocks above. In the crests of the domes gas caps are usually found though, if seepages have been active through a fracture in the caprock, these gas caps may be small.

The intense folding and flexing of this rock mass has cracked and fissured it extensively and this fissure system is responsible for the very free fluid connection throughout the reservoir which is the feature of these fields. The late Lord Cadman in one of his addresses referred to it as "the transport organization of the underground reservoir system." These fissures are, however, small, being normally less than 0.1 in. in width and they do not contribute a large proportion of the storage space in spite of the fact that when a well is drilled no appreciable production is obtained until a fissure is penetrated, even though the drill may pass through bands of highly porous rock. Though opinions vary, it is generally estimated that at least 80 per cent of the recoverable oil is stored in the porous limestone while only 20 per cent exists in the fissures.

(b) Producing conditions. — Before

Automatic limit valve

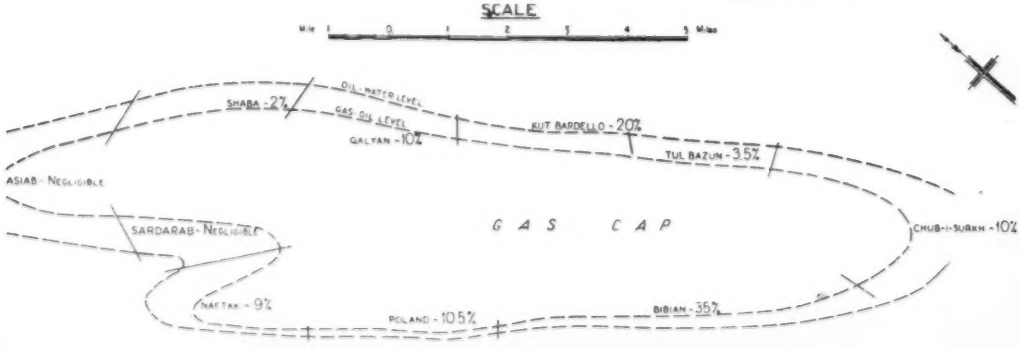

Fig. 8—Diagram of M.I.S field showing allocation of production quotas

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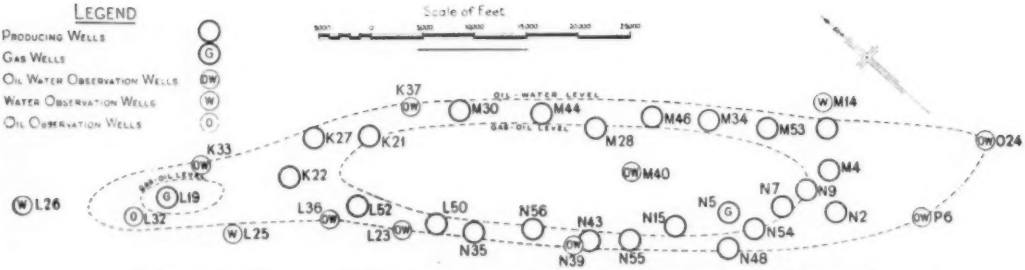
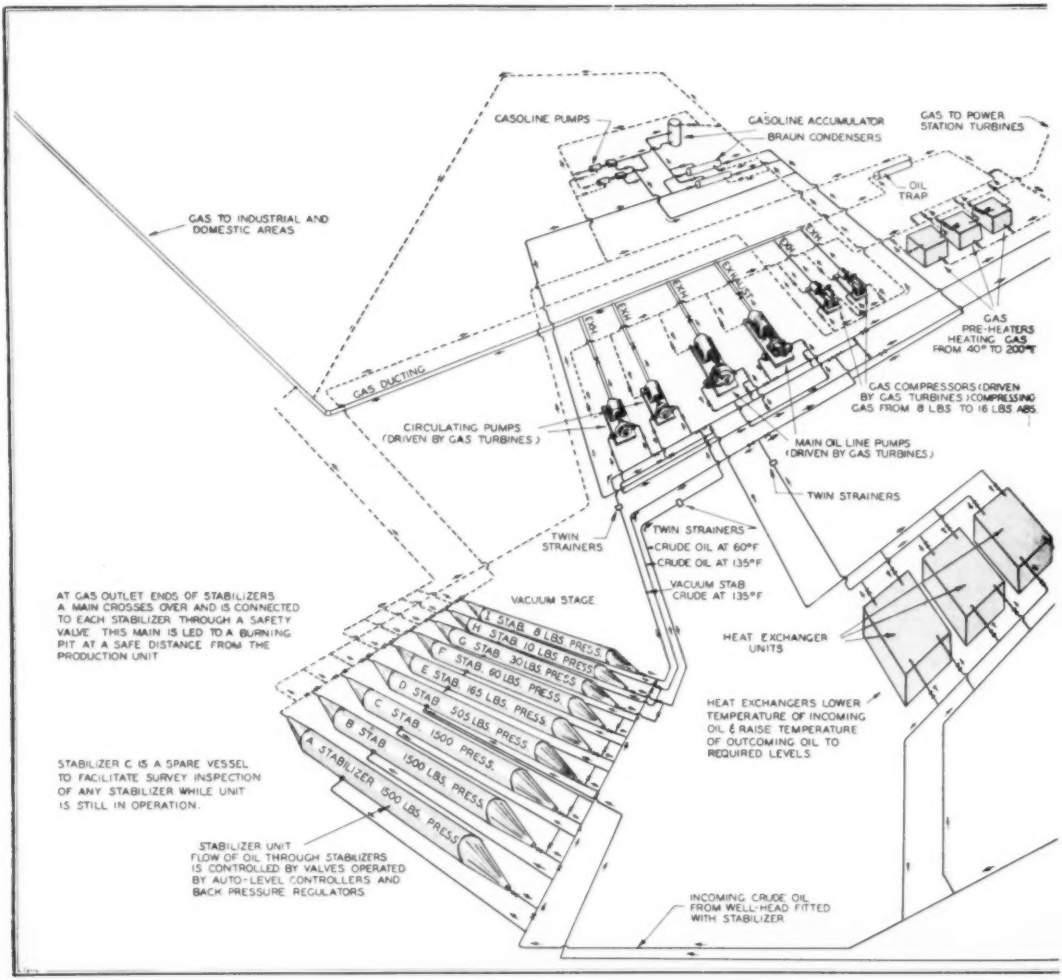


Fig. 9—Underground contour map of Haft Kel field showing location of wells for production of 220,000 bbl. per day

production commences, the pressure in the reservoir is equivalent to the difference between the hydrostatic head of a water column standing in the formation to the level of the nearest surface outcrop and the head of the oil column in the producing formation (Fig. 7). It is therefore possi-

TABLE 1—ASMARI LIMESTONE CLASSIFICATION

Type	Visual characteristics—	Average porosity (Approx. per cent)	Average permeability, md.
1	Dark gray to light gray and fawn limestones, compact and shiny	2	0.00005
2	Light gray, fawn and light brown limestones, compact	5	0.00007
3	Brown and sometimes light brown limestones, rather granular with some visible voids	10	0.05
4	Brown and dark brown limestones, granular, with many visible voids	15	0.5


GASOLINE PUMPS
GASOLINE ACCUMULATOR
BRAUN CONDENSERS
GAS TO POWER STATION TURBINES
OIL TRAP
GAS TO INDUSTRIAL AND DOMESTIC AREAS
GAS DUCTING
GAS PRE-HEATERS HEATING GAS FROM 40° TO 200°F
GAS COMPRESSORS (DRIVEN BY GAS TURBINES) COMPRESSING GAS FROM 8 LBS. TO 16 LBS. ABS.
CIRCULATING PUMPS (DRIVEN BY GAS TURBINES)
MAIN OIL LINE PUMPS (DRIVEN BY GAS TURBINES)
TWIN STRAINERS
TWIN STRAINERS
CRUDE OIL AT 60°F
CRUDE OIL AT 135°F
VACUUM STAB CRUDE AT 135°F
VACUUM STAGE
H STAB. 8 LBS. PRESS.
G STAB. 10 LBS. PRESS.
F STAB. 30 LBS. PRESS.
E STAB. 60 LBS. PRESS.
D STAB. 165 LBS. PRESS.
C STAB. 505 LBS. PRESS.
B STAB. 1500 PRESS.
A STABILIZER 1500 LBS. PRESS.
HEAT EXCHANGER UNITS
HEAT EXCHANGERS LOWER TEMPERATURE OF INCOMING OIL & RAISE TEMPERATURE OF OUTCOMING OIL TO REQUIRED LEVELS
AT GAS OUTLET ENDS OF STABILIZERS A MAIN CROSSES OVER AND IS CONNECTED TO EACH STABILIZER THROUGH A SAFETY VALVE. THIS MAIN IS LED TO A BURNING PIT AT A SAFE DISTANCE FROM THE PRODUCTION UNIT
STABILIZER C IS A SPARE VESSEL TO FACILITATE SURVEY INSPECTION OF ANY STABILIZER WHILE UNIT IS STILL IN OPERATION.
STABILIZER UNIT
FLOW OF OIL THROUGH STABILIZERS IS CONTROLLED BY VALVES OPERATED BY AUTO-LEVEL CONTROLLERS AND BACK PRESSURE REGULATORS
INCOMING CRUDE OIL FROM WELL-HEAD FITTED WITH STABILIZER

ble, within certain limits, to forecast the order of pressures which may be expected in a reservoir before the drill first penetrates it. It does not follow, however, that, when oil is drawn off, this water level will rise in direct relation to the amount of oil produced.

In "M-i-S" field, although the original pressure conformed with these conditions, after production had been drawn for some years it was found that the water level had not risen as a result of this production but at a much slower rate. This indicated that the connection through the limestone below oil water level was very poor and that such rise as was recorded was probably largely due to the expansion of the large body of water underlying the oil reservoir.

In Haft Kel field water rise is much more rapid though still not a competent water drive. In the newer fields insufficient data are as yet available for the exact conditions to be known.

The oil in the reservoir is saturated with gas to pressures which vary in each field and with depth. This dissolved gas does much to actuate the mechanism of production. When oil is drawn from the reservoir it flows through the fissures towards the wells and the pressure of the whole reservoir is lowered by the reduction in the depth of the oil column. When the pressure falls below saturation pressure gas starts to come out of solution and to migrate upwards into the crest of the structure.

When this reduction of pressure becomes effective in the porous rock which is saturated with oil the expansion of the gas coming out of solution expels the oil from the pores, thus replenishing the supplies in the fissures from which the wells are drawing. At the same time this reduction in pressure may cause the water level to rise. While displacement of oil by water from the fissures is probably nearly 100 per cent efficient, in the pores the efficiency of displacement is low owing to capillary force.

(c) Control of production.—As soon as possible after production commences it is necessary to collect certain physical data, so that the production program of the field can be planned on sound scientific lines. Gas, oil, and water levels and pressures must be accurately observed and regularly recorded under uniform conditions and since production wells, even if suitably sited, can seldom be spared for long periods it is necessary to drill wells specially sited for observation purposes only. These wells are the pressure gages and the gage glasses of the reservoir, enabling a watch to be kept on water, oil, and gas levels and on their movement as production is drawn off. The very large production rates cannot be safely maintained without an intimate knowledge of the reservoir conditions which may vary in different parts of the field. Overproduction in an area or a well may cause the drawing down of gas and the coning up of water, an effect which is immediately recorded if the observation wells are correctly sited.

In M-i-S field, after occurrences of this nature, it was found that there was a wide variation in the producing capacity of different areas and an inspection of the illustration of this reservoir (Fig. 8) will show the allocations made. In Haft Kel field, profiting by the experience gained in the oil field, observation wells were drilled early in the producing life and it has been possible to maintain a perfect balance throughout the whole field and to pick up evidence of the upsetting of levels before damage can be done and to apply the necessary rectification to the production quotas

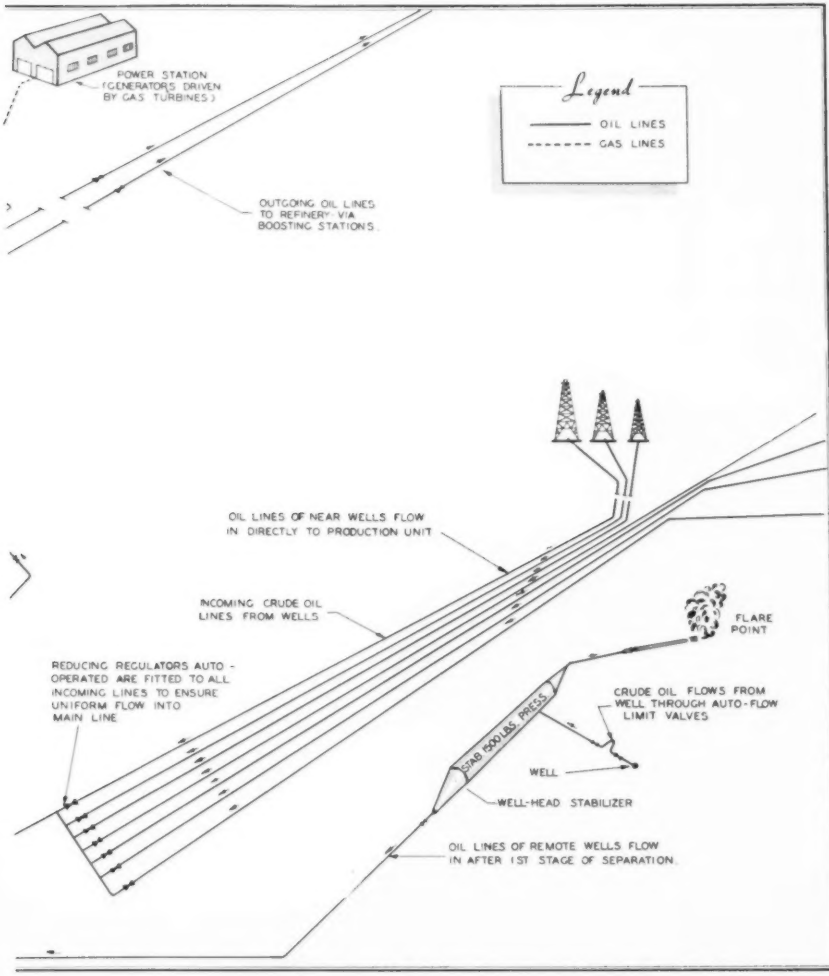

POWER STATION (GENERATORS DRIVEN BY GAS TURBINES)
Legend
OIL LINES
GAS LINES
OUTGOING OIL LINES TO REFINERY VIA BOOSTING STATIONS
OIL LINES OF NEAR WELLS FLOW IN DIRECTLY TO PRODUCTION UNIT
INCOMING CRUDE OIL LINES FROM WELLS
FLARE POINT
REDUCING REGULATORS AUTO-OPERATED ARE FITTED TO ALL INCOMING LINES TO ENSURE UNIFORM FLOW INTO MAIN LINE
CRUDE OIL FLOWS FROM WELL THROUGH AUTO-FLOW LIMIT VALVES
STAB ISOLUS PRESS
WELL
WELL-HEAD STABILIZER
OIL LINES OF REMOTE WELLS FLOW IN AFTER 1ST STAGE OF SEPARATION

Fig. 10 — Diagram of crude-oil production unit

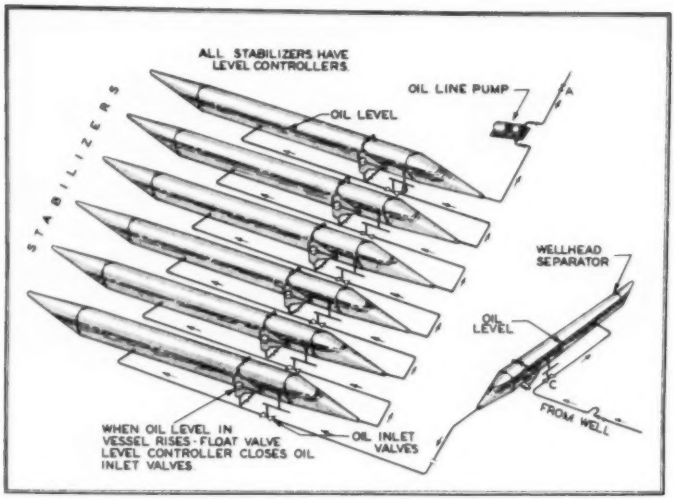


Fig. 11—Diagram of level controllers to stabilizers and well-head separators

which would restore the levels to stability.

This field, an illustration of which is given (Fig. 9), provides an example of a fully developed field the production drawoff from which has been found to be about 220,000 bbl. per day.

During the war production was drawn from the minimum number of wells, all others being sealed off for security reasons. In this period some areas were produced without observation wells; fortunately extensive data collected prior to the war enabled a safe quota to be allocated and no damage resulted.

In addition to this information, production must be accurately recorded from each well and gas-oil ratios measured. Saturation pressures and bottom-hole pressures must be recorded under reservoir conditions and bottom-hole differential pressures must be taken under varying flowing conditions. Reservoir temperatures must also be recorded.

(d) Well spacing.—The spacing of wells to obtain efficient drainage, so important in fields of limited permeability, does not have quite the same application under Iranian conditions. Migration is so free that a single well suitably sited can drain from great distances. The siting of producing wells is, however, important from the standpoint of insuring the longest possible producing life. The expanding gas cap and rising water level limit the area in which these wells can be sited to a ring extending round the flanks of the dome and aimed at a point where these levels will meet when production is exhausted. After the movement of these levels has been observed over a period of production, this point can be forecast with what will probably prove to be a fair degree of accuracy.

The distance between wells in the higher-pressure fields is governed to a certain extent by surface development demands. In Agha Jari field the flowing capacity of wells is high, the average producing capacity per well being about 22,000 bbl. per day. Since production units are now designed for a throughput of 176,000 bbl. per day, a group of 8-10 wells is required to feed to one central point. The length of production flow lines on the surface has to be considered since in the very broken terrain in this field the laying of long high-pressure graded lines is a matter of some difficulty. An arbitrary limit of 4 miles was fixed for these lines and a well spacing of 1 mile adopted. This interval appears to suit producing conditions in all respects and is moreover a convenient step making the geologic allocation of the wells relatively simple.

2. THE SURFACE SYSTEM

(a) The production well.—Wells intended for production are drilled into the reservoir rock until mud losses indicate that open formation has been struck. The well is then bailed down until the pressure of the oil lifts the mud column and the mud is flowed out. When all mud has been removed, the flowing capacity of the well is measured at the required pressure. This pressure is not necessarily that at which the well gives its highest production, but is dependent on the following factors:

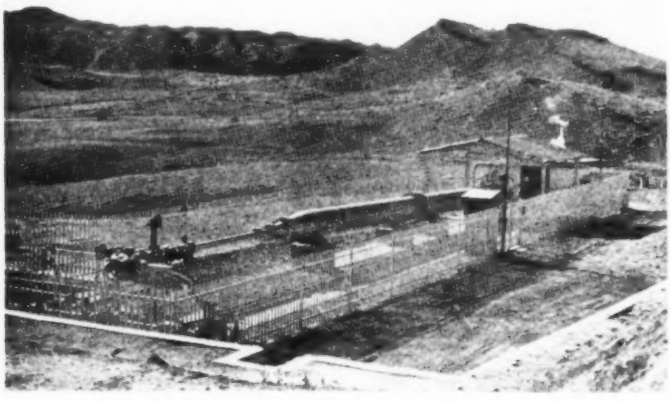
(i) Flowing rate must be limited to avoid fragments of limestone being brought to surface.

(ii) Well-head pressures must not be reduced to a point where the high formation pressure might cause the casing to collapse. In Agha Jari well-head pressure must not be reduced below 1,000 psi.

(iii) Flowing pressures must be high enough to deliver the oil to production units sited at high surface elevations so that as much gravity head as possible can be made use of for pipe-line deliveries.

(iv) Well-head pressures must be sufficiently high to provide maximum flexibility in the stages of pressure reduction (see "multistage stabilization").

In order to achive the best possible flowing conditions the minimum differential in bottom-hole pressure must be aimed at, and though wells in all fields, except M-i-S, are usually capable of producing 14,200 bbl. per day at the initial test, acid treatment is nevertheless applied. The reservoir rock is readily attacked by hydrochloric acid which enlarges the fissures; and few wells fail to respond to acidizing. In open formation three or four treatments are sometimes necessary, 1,000 gal. of inhibited acid being forced into the formation and



Flowing well and well-head separator, Gach Saran

left for periods up to 16 hours. In tighter formation it has been found that better results are obtained with shorter periods since the products of reaction tend to mud off the formation thus nullifying the effects. Wetting agents are sometimes used and a deeper penetration usually results. The production of wells is invariably increased and productions of the order of 28,400 bbl. per day are frequently achieved.

(b) Surface production schemes.—The first production system installed in M-i-S field followed more or less orthodox lines and included wellhead separators, atmospheric flow tanks and collecting units and a gas absorption plant for the recovery of light fractions.

In fields developed since this early stage higher flowing pressures have enabled a simpler and more efficient system to be installed the main principles of which are as follows: (Refer Fig. 10).

(i) All tankage is dispensed with, the refinery being, in effect, directly connected to the reservoir.

(ii) The energy of the wells is utilized to replace prime movers, pumps, etc., in the system.

(iii) The separation of gas is accomplished so that all possible light fractions are retained and so that varying qualities of crude can be delivered to the refinery.

(iv) The whole production system is automatically controlled, requiring no manual operation.

(c) The well head.—Crude flowing from the well first passes through a flow controller which regulates the amount required from the well. It next passes into a high-pressure separator which takes off all free gas. From this separator it is delivered through a graded pipe line to the central stabilization unit. Embodied in this assembly is a safety device which automatically cuts off the flow from the well in the event of a failure in the system. During the war much thought was given to the safety of these fields from damage and an ingenious differential valve was designed which could be set to pass certain rates of flow. If this flow were exceeded the valve closed and cut off the flow entirely. Although originally intended to be set in the bottom of flowing wells the application to surface plant was soon realized and every production well assembled is now so equipped.

(d) The central stabilization unit.—Five stabilization units are now installed in these fields of capacities from 44,000 to 176,000 bbl. per day. In all these units multistage stabilization is employed. This system, which can only be employed in fields where flowing pressures are high, is designed to retain butanes and pentanes in the crude by the process of releasing the dissolved gases in a number of stages of pressure reduction. The advantages claimed for this system compared to the recovery of

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light fractions by absorption or compression are: Simplicity of operation; 100 per cent time efficiency; minimum of services, maintenance, and routine testing, and economy in steel and erection costs.

The ideal staging of pressure reduction depends on the gas-oil characteristics of the crude, but in general terms stages should be arranged so that an equal volume of gas at the pressure of separation is liberated at each stage. This is not always possible as the first stage is more or less dictated by the pressure of the well. In the Haft Kel field the first stage of separation, having regard to the characteristics of the crude would have been 750 lb. Since the wells had to be flowed at pressures of 450-550 psi. to obtain the production quotas the first stage of separation was carried out at this pressure.

Thereafter five more stages of pressure reduction were employed as follows: 218, 102, 55, 34, 25 psia. At this pressure (say 10 psi.) crude is delivered to the pipe line, its quality being equivalent to that which would have been obtained by processing the gas separately and injecting the products recovered into the crude.

If atmospheric crude is required a seventh stage is included. In Agha Jari field an additional stage for the production of vacuum stage crude is included. The object of this stage is to stabilize the crude for export on tankers where high - vapor - pressure crude is subject to considerable loss in transit from evaporation.

The most modern of these units has recently been installed in Agha Jari field and a brief description of this unit may be of interest.

Capacity 165,000 per day.
Source of crude, 8 wells.
Gravity of crude, 36° A.P.I. at 60° F.
Gas-oil ratio, 150:1.
Temperature, 140° F.
Well flowing pressure, 1,500 1,600 psi.

Stages of stabilization—

First-stage separation	1,[illegible] psi.
Second-stage separation	500 psi.
Third-stage separation	180 psi.
Fourth-stage separation	62.5 psi.
Fifth-stage separation	29.5 psi.
Sixth-stage separation	14 psi.
Seventh-stage separation, Atmos. pressure	
Vacuum-stage separation	8 psia.

(e) Design of separators.—In these fields the horizontal separator has been standardized in preference to the vertical type, as being more suitable for the gas-oil ratios of Iran crude. The principal of separation found to give highest throughput and best recovery of light products is to insure that the crude flows through the whole system without shock and with a minimum of turbulence either from the liberation of gas or from the design of the pipe line or vessels. The crude enters the vessel through a tangential inlet which delivers it through a special baffling device which changes the direction of the flow from tangential to longitudinal with a minimum of turbulence. The vessel is designed to provide a large surface of oil over which gas can evaporate and a low fluid velocity.

The problem in Agha Jari presented one new feature—the temperature of the crude. In this new field the producing zone lies at depths down to 7,500 ft. below sea level and the temperature of the crude at the well head is about 140° F. In order to retain the light fractions in the crude so far as possible it was necessary to include in the Agha Jari stabilization units a battery of heat exchangers whereby the incoming crude is cooled by the outgoing crude, which has been cooled by the expansion of the gas.

(f) Utilization of gas.—The gas from this unit is utilized in several ways. First, expansively it is used to drive the pipe-line boosting pumps, electric lighting plant, and sundry other items of plant. Secondly, thermally it is used industrially for firing boilers, plaster kilns, in the forge and foundry and for heat treatment; domestically for cooking, sanitation, refrigeration, house heating, etc. It is transmitted long distances for use in areas where supplies are not available and can be drawn off the approximate stage of separation giving the required pressure.

(g) The automatic control system.—The automatic control system installed on each of these units regu-

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lates the flow of oil in all sections from the well to the pipe line and, once started up, no manual operation is necessary. If it is desired to vary the production of one particular unit all that need be done is to regulate the flow down the main pipe line to the required throughput. The automatic controls thereupon regulate the flow throughout the whole system and open or close the well to the required quota. The operation is as follows (See Fig. 11).

The main pipe-line control valve regulates the flow to the refinery. Let us suppose a reduction in deliveries is required. The valve "A" is closed the required amount thus restricting the flow. The last stage separator starts to fill up and the oil level controller "B" restricts the flow from the next stage. The process is repeated through all the seven stages to the well head separator. This starts to fill up as in the case of the others and the level controller "C" actuates a compressed air or gas relay which operates the flow controller on the well head. The well is closed in and settles down to the new rate of production.

It is quite possible to imagine the field production being controlled from the refinery by the simple operations of shutting the valve against the main line flow. This, however, is a dream which is most unlikely to come true since however perfect an understanding might exist between production and refinery it is perhaps expecting too much of human nature to install a system whereby the refinery superintendent controls the production of the oil field.

3. RECYCLING

No paper on the oil fields in Iran would be complete without a reference, however brief, to that unique feature, the ability to recycle products back to the reservoir. Market conditions are seldom stable in any trade, and in the oil business demands for specific products fluctuate continually. The input to the Abadan refienry, the largest in the world, is approximately 484,000 bbl. per day, and like other large refineries similarly placed, Abadan suffers periodic out-of-balance conditions of products to meet market requirements. A flexibility factor exists in the ability to recycle products back to the reservoir.

This facility was developed in 1930 in M-i-S field with remarkably successful results. Products are pumped back into the gas dome (Fig. 7) through which they gravitate down to the main body of the crude. Owing to the fact that the water encroachment in this field is very small with a consequent enlargement of the gas dome with production (the volume of which is at present 4 cu. miles of oil saturated limestone) these recycled products on their way absorb not only gas by diffusion, but interchange with reservoir crude left behind in the pores, thereby rectifying the quality of recycle stock.

Sixteen wells are allocated to recycling, each having a capacity of 250,000 gal.* per day. The return of products is spread evenly over the gas dome, the maximum rate being about 750,000 gal. per day.

Acknowledgments and References

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Extracts and illustrations are made from the following:

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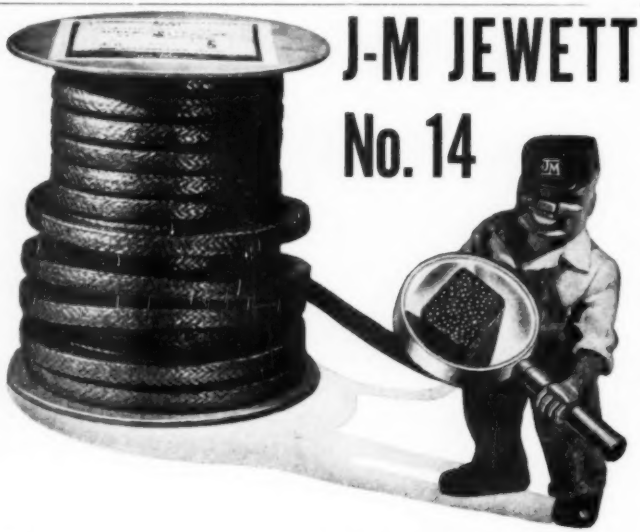
*Imperial gallons. Approximately 35 Imperial gallons equal 1 U. S. barrel (42 gal.).



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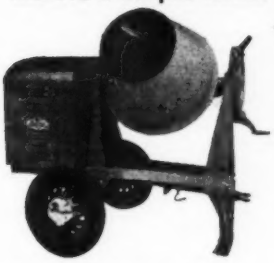

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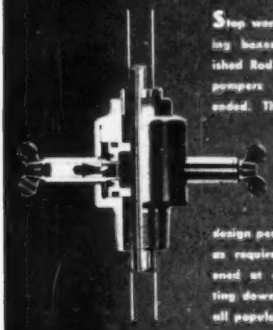

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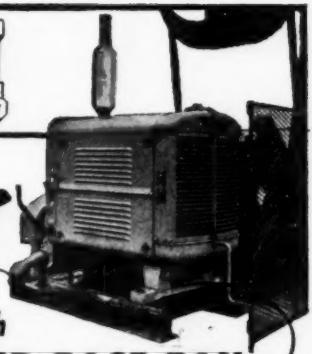

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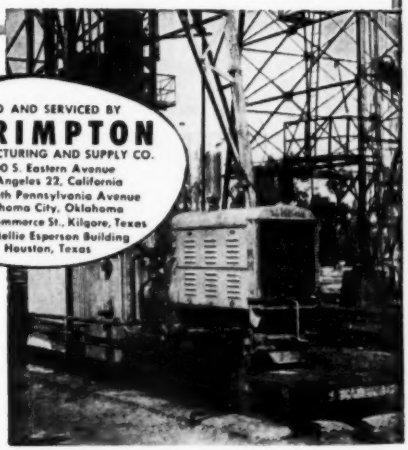

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Basal Sundance Repressuring

(Continued from page 124)

1938 by strict control of oil-producing rates. Gas-oil ratios were arbitrarily controlled at less than 1,000 cubic feet per barrel.

Advent of pressure maintenance in February 1938 halted the subsurface pressure decline at about 800 psi. By injecting volumes of gas greater than total withdrawals the pressure was gradually raised to slightly over 820 psi. and was maintained at or above 800 psi. for almost 4 years. By September 1946 the subsurface pressure had declined only 40 psi. to 760 psi.

During the period from the beginning of pressure maintenance in February 1938 until September 1946, the reservoir produced approximately 13 million barrels of oil. Early in 1938 the daily production was 7,500 bbl. per day with an average gas-oil ratio of 1,000 cu. ft. per barrel, and by September 1946 the daily average production was down to 4,800 bbl. per day with a gas-oil ratio of 3,400 cu. ft. per barrel. During this period gas was injected into the reservoir at rates from 5 to 10 million cubic feet per day.

The expanding gas cap necessitated shutting in progressively more wells since production of gas at the increasing gas-oil ratios exceeded the repressuring-plant capacity even though the plant had been enlarged on three separate occasions. Gas injection rates of nearly 9 million cubic feet per day exceeded gas production during 1938, 1939, and 1940, and nearly equaled production for the period from 1943 to 1947. Surplus L.P.G. products totaling nearly 30 million gallons have been returned to the sand.

As previously mentioned, the movement of the water table has been very slight with the production of water leveling off at about 200 bbl. per day in 1943. Further proof of a relatively inactive water drive is evidenced by the cumulative production of less than 500,000 bbl. of water with 23½ million barrels of oil for an overall percentage of less than 2.

The unit engineering subcommittee early in 1947 observed that there was an abrupt change in the pressure decline curve due to gas-injection rates lagging progressively behind reservoir withdrawals. Where reservoir pressure had been comparatively constant, it was now falling at a rate of about 4 psi. per month. The subcommittee studied the reservoir performance to that date and decided that, since it was becoming increasingly difficult to maintain production rates due to high gas-oil ratios and a small oil ring, perhaps a different approach should be considered.

They reasoned that, since pressures had been maintained at almost 50 per cent of original pressure, there could be considerable oil yet unrecovered in the tight, relatively low-permeability zones in the reservoir and that if the reservoir pressure were lowered more rapidly by the cessation of gas injection, expansion of solution gas would free this oil and increase total recoveries. Since core-analysis information was by no means complete, the uniformity of porosity and permeability in the reservoir was unknown and, consequently, an estimate of the volume of additional oil recovery was impossible.

The "depressuring" program was approved by the unit planning and operating committee and in July of 1947 at a meeting with the USGS and the Bureau of Mines a final plan was agreed upon. The depleted Dakota sand was chosen as a storage reservoir for the gas and three wells were reconditioned or recompleted for this purpose. This work was completed late in the fall of 1947, and in January 1948 gas injection to the Basal Sundance was discontinued.

Reservoir pressure decline began shortly after depressuring was begun and soon reached a value of 14 psi. per month, or 3½ times the previous decline. The first reaction, other than pressure decline, was noticed in the sharp drop in oil production on wells on the flat east flank of the west reservoir.

Pressures in this area were already below field average due probably to a low-permeability streak occurring west of this area. Reasons for decline in production in this part of the field were difficult to determine since the conversion from flowing to pumping operations with the attendant difficulties in pumping high-gas-oil ratio wells somewhat influenced production rates. Some wells virtually quit producing when the casing-head pressure plus the weight of the gas column nearly equaled static reservoir pressure. Equalizing lines from the casing head to the flow lines eliminated these difficulties in most cases.

Two wells inside the unit area and near the oil-water contact line suffered almost complete loss of productivity apparently due to blocking of the sand by the creation of an oil-water emulsion at or near the well bore. These wells were aided by pumping several hundred barrels of oil back into the formation at the highest possible volumes and pressures. This might have been an application of the much discussed Hydrafrac process, but is more likely attributable to opening a channel from the well bore back up structure to the oil ring.

By January of this year, reservoir performance curves have varied very little from trends established previous to depressuring. Subsurface pressure decline was not much greater than the trend indicated late in 1947. The barrels per day of oil production was still following a slope es-

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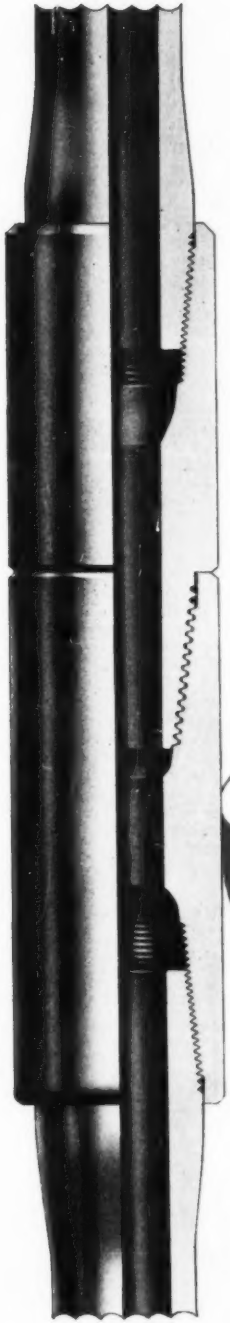

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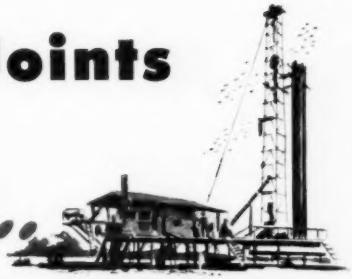

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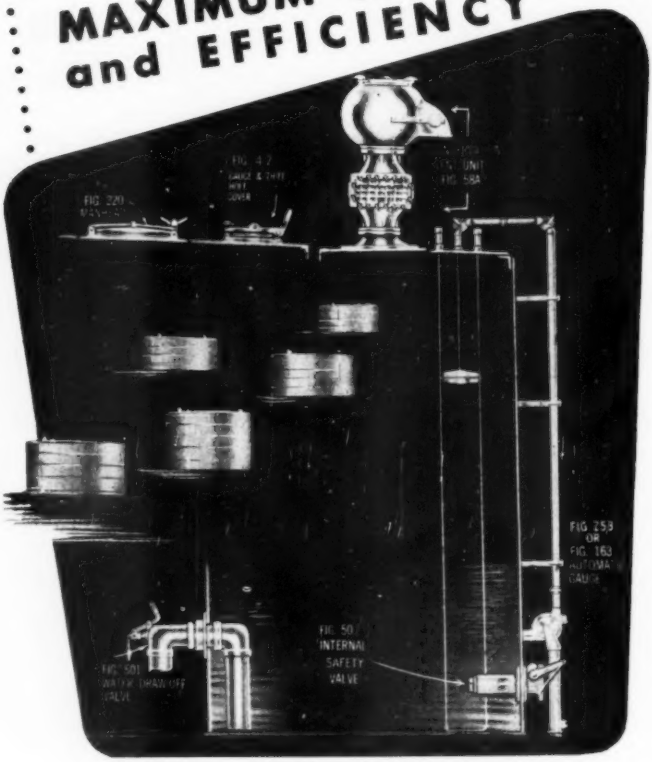

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tablished early in 1945, at the time of the last arbitrary proration, and water per cents had increased very little. However, an explanation for the fact that the daily average oil production trend had not changed could be that additional wells, previously shut in for high gas-oil ratios, were put on production. This has been possible since additional plant capacity has been created by a decline in gas production from the reservoir.

On the other side of the ledger, we have not been able to show where we were actually receiving any additional oil from solution-gas expansion since daily average production rates have not increased as we had hoped; nor were we able to find any additional oil in wells which had gone entirely to gas above the oil ring. We also had some evidence, in the above-mentioned two wells, of an encroaching water table which could endanger our ring of oil-producing wells either from water flooding or emulsion blocks, although this threat was not in itself serious.

At the present time we are again studying the results of this program, but the study is incomplete as yet and no decision has been made concerning future production methods.

In conclusion, I would like to point out that regardless of the results of this program, we do not believe that we have instituted any abrupt change in reservoir performance. Actually, we have only speeded up a condition which was inevitable in the future. Our original idea of recovering additional oil from the tight zones by solution-gas expansion was sound, assuming that we were not dealing with a reservoir with unusually uniform porosity and permeability conditions. The possibility of a low-pressure gas sweep with further increased recoveries was also sound reasoning.

The Basal Sundance sand has produced to date better than 23½ million barrels of oil out of a total of 48 million barrels of original tank oil in place for a recovery of over 49 per cent.

Acknowledgments

The author wishes to express his appreciation to Nat A. Slagter, Lance Creek Unit Coordinator, for the use of his records and his helpful suggestions and to the members of the unit engineering subcommittee for their advice.

Thanks are also due to R. D. Ferguson, of the United States Geological Survey, for permission to publish his estimates of reserves.

Three separate reports have been used as general references. These are:

"Joint Study of Repressuring in Lower Sundance Sands, Lance Creek," compiled by Charles S. Livingston and A. W. Buell in 1936.

A paper presented at the Denver and Tulsa meetings of the A.I.M.E., September and October 1947, by L. F. Elkins, R. W. French, and W. E. Glenn entitled "Lance Creek Sundance Reservoir Performance—A Unitized Pressure-Maintenance Project."

"Progress Report of Depressuring Operations in the Basal Sundance Reservoir, Lance Creek Field, Niobrara County, Wyoming," by C. C. Frye and J. A. Donaldson of Continental Oil Co.

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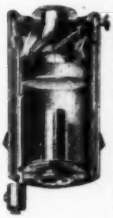

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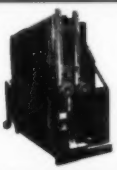

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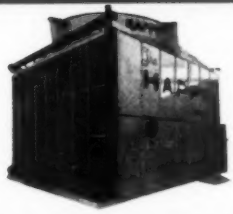

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Formation SLIPPAGE at Wilmington

by Robert Harwick
District Editor

Earth subsidence in this California field causing increasing concern to oil operators

THE earth subsidence and underground strata slippage in the region of Long Beach, Calif., has become a matter of prime concern to the oil-producing companies and industrial installations located there.

Some results of the subsidence border on the spectacular. This is especially true in the Terminal Island section where the drop in land level is most pronounced. Here the Southern California Edison Co. steam plant has settled vertically nearly 9 ft. The Ford Motor Co. assembly plant has settled about 7 ft. below the level on which it was erected. The Navy has already spent 1½ million dollars, mostly on diking, to protect its harbor installations and estimates that 4 to 5 million more may be needed. This particular section where these installations are located has become fixed in the public mind as the total area of trouble.

As this area is all land that has been raised by filling with dredgings from the harbor, the settling may be due entirely to earth compaction. Somewhat complicating the straight compaction theory is evidence of slow earth movement toward the geographical center of subsidence. In places surveyors' bench marks are displaced as much as 4 ft. from their original placement.

And there are movements in the earth that may or may not be directly connected with the surface movements. One of the more pronounced and damaging of these is the slippage of strata centering around 1,650 ft. below the surface. Oil wells in the part of Wilmington field where this slippage occurs are seriously affected.

The over-all problem has been studied carefully over a number of years. A considerable body of fact has been assembled. The Long Beach Harbor Department, in conjunction with Southern California Edison Co., made the first studies. Data have been gathered since 1940. In 1944 a group of experts outside these two agencies were brought into the case. Over 100 specialists in the fields of geology, petroleum engineering, tectonics, soil mechanics, and civil engineering have worked with the Long Beach Harbor engineering staff on the problem.

In addition, there are now the Grant-Gilluly-Johnson board, the Stanford Research Institute, and Harris Engineers employed by the Navy Department.

The Stanford Research Institute program alone involves 25 to 30 engineers and scientists and is expected to cost its 20 sponsors $165,000. The institute's work is about completed.

In spite of the great amount of work done so far, no complete explanation of the phenomenon, satisfactory to all parties concerned, has been agreed upon.

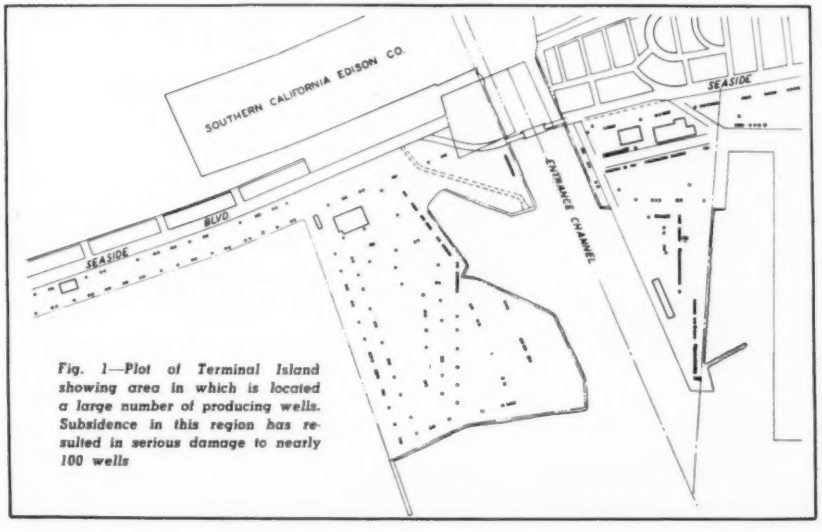
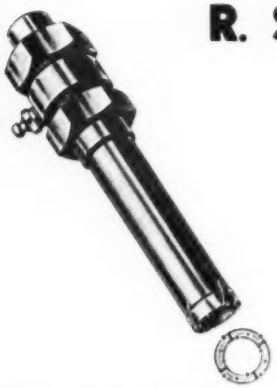


Fig. 1—Plot of Terminal Island showing area in which is located a large number of producing wells. Subsidence in this region has resulted in serious damage to nearly 100 wells

Subsidence and slippage are not a new occurrence in this area. Cores taken at the slippage depth show striations 60° off present direction of movement, proving previous slippage at some time past.

Subsidence was brought to public attention only as it reached serious proportions. Records of the Long Beach Harbor Department engineering staff show that the entire city of Long Beach, the entire community of Wilmington, and many



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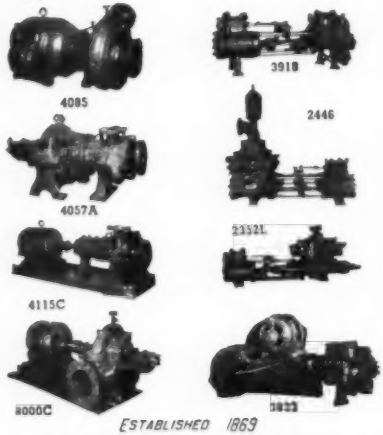

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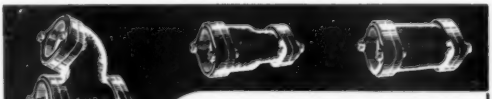

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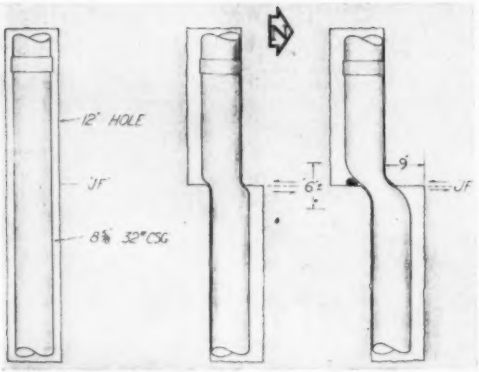

Fig. 2—How strata slippage around 1,600 ft. below the surface in the subsiding area produces shearing forces which cause casing collapse

square miles of the surrounding country have subsided from 6 in. to 2½ ft. in the last 20 years.

Engineering surveys reveal that there are specific areas within the general subsiding area that have subsided much more than others. The east portion of Terminal Island is the center of one of these specific areas of greater subsidence. This area, generally referred to as the Harbor Subsidence, is elliptical in shape and is nearly 10 miles long by 5 miles wide.

1,000 Wells in Subsidence Area

Wilmington field, most of which is in the subsiding area, contains 2,131 producing wells. About 1,000 wells are in the Harbor Subsidence area.

While many oil-producing surface installations have subsided below the high tide mark in the harbor section of Wilmington field, the greatest threat to the productive capacity of the wells is the strata slippage that has occurred around 1,650 ft. The formation at this depth is shale and is within the Upper Pliocene formation, known as the Pico formation. It lies about halfway between the surface and the top of the first oil-producing zone.

Wilmington field itself is an asymmetric anticline complicated by transverse faults that divide the field into six major fault blocks. There are seven known producing zones. The field was discovered in 1936 and has produced 430 million barrels of oil to date.

Just above the oil zones there is an unconformity. From there to the surface there is a regular, uniform monocline dipping southwest about 3°. It is within this monocline that portions of the Pico formation have shifted.

Evidence of strata slippage was first brought to the attention of the engineering staff of the Harbor Department when well No. W-55, of Long Beach Development Co., stopped pumping on December 24, 1947. The stoppage was self-announced. Investigation showed the sucker rods jammed somewhere down the well. Further checking with a 7-in. impression block showed the casing collapsed just beyond 1,600 ft.

Between this date and May 20, 1948, 11 other wells went off production. Seven were self-announced. Four were found in the course of routine servicing of the wells.

Checking Program Instituted

In February 1949 a program was instituted to check systematically the wells in the harbor area. In all, 97 damaged wells were discovered. Of these 19 are now cemented off and 7 have been redrilled. The rest are now producing, following remedial efforts.

By means of "feeler" devices, impression blocks, and in-well photographs* of damaged casing the area of damage was set as centering at 1,650 ft. The entire interval in which damage was found runs plus or minus 100 ft. of this point.

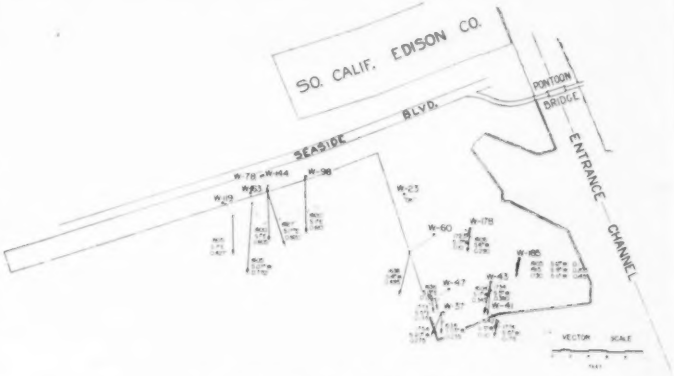

Fig. 4—Magnitude and direction of shear

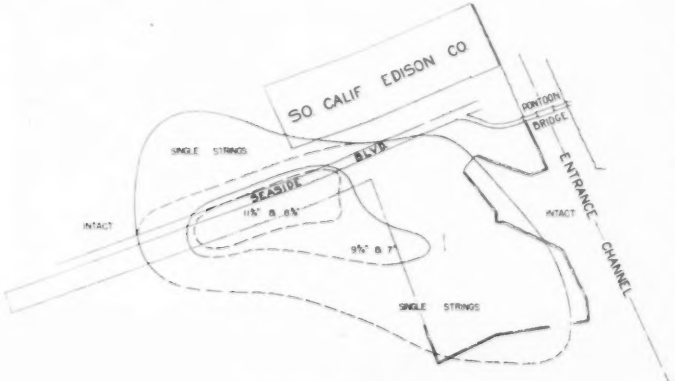

Fig. 3—Area of equal shear

The in-well photographs showed casing failure through shear and compression. First pictures taken showed a compression failure. In fact the same damage pattern was made by subjecting a casing sample to destruction tests in a hydraulic press. Later evidence showed casing that had failed because of shear forces. The bulk of present evidence indicates that shear is the cause of most of the damage (see Fig. 2).

The line JF is the name given to the line of slippage by the Long Beach Harbor Department engineers. Coring shows that the JF interval is consistently slickensided.

Fig. 3 shows the area of equal shear in this slickensided area. The fol-

*For article on this subject, see "Casing Checks Obtained with Deep-Tube Camera," by Robert Harwick, The Oil and Gas Journal, July 14, 1949, p. 88 et seq.

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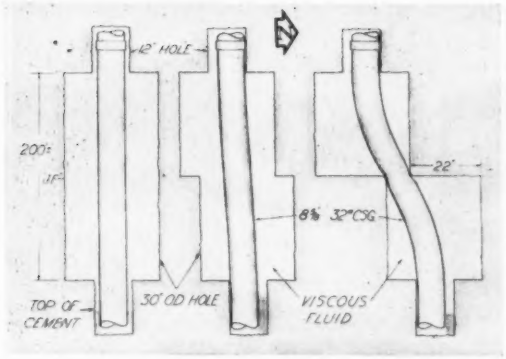


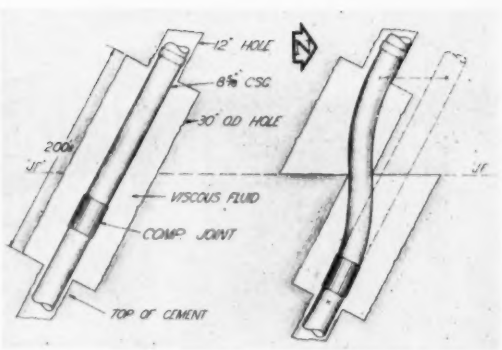


Fig. 5—(Left) This method is being employed to protect new wells drilled through the 1,600-ft. zone. Fig. 6—(Right) As a further precaution compression joints will be employed on new wells

lowing table shows how far the shale must slip before casing would be damaged.

	Hole size (in.)	Casing size, in. Outer	Casing size, in. Producing	Formation movement* (in.)
Double string	17½	13⅜	8⅝	7.89
Double string	12¼	9⅝	7	4.27
Single string	12¼		9⅝	2.52
Single string	12		8⅝	3.37

*Distance formation can move before producing string is damaged.

The greatest amount of slippage has occurred in wells in the narrow strip of land between Seaside Boulevard and the harbor. Here movement has been sufficient to take out double strings of casing as well as all single strings in the sector. Movement, as measured in this sector, varies between .427 and .770 ft. These measurements were made with a special instrument developed through the cooperation of the Long Beach Harbor Department engineers and Eastman Survey Co.

The degree and direction of slippage is graphically shown in Fig. 4.

Location of Movement

All movement is between south 17° west and south 17° east. This direction is opposite to surface movement at this point and differs from the dip of the Pico formation by nearly 90°. There is no equivalent movement at this depth anywhere around the elliptical area of Harbor Subsidence. This sector is the only place showing this formation slippage.

So far it has not been determined whether the movement of this part of the Pico is a creep or has occurred in a series of sharp movements. The first well to go out had been completed December 4, 1943. There was no sign of trouble up to the time of failure more than 4 years later. The well casing was a single string of 8⅝-in. set in a 12-in. hole. This permitted a formation movement of 3.37 in. before the shale was in contact with the casing. With movement approaching 8 in. even double strings have failed.

The last double string to go out was one put down in June 1947. A double string put down in July 1947 shows no damage. Single strings set in January 1948 show damage, but not single strings set after then. There is no evidence of any further motion since February 1948. However, surface subsidence and surface motion continue.

The Long Beach Harbor engineering staff at present has established a series of observation wells. These are checked every 2 months. These wells serve as a watch point for the possible continued movement of the shale. As part of the observation program three damaged wells were resurveyed 2½ months after the original survey. No additional movement was noted.

In the meanwhile efforts are being made to protect new wells drilled through the 1,600-ft. zone. These methods are illustrated in Figs. 5 and 6. Here again, the line JF denotes point of shear.

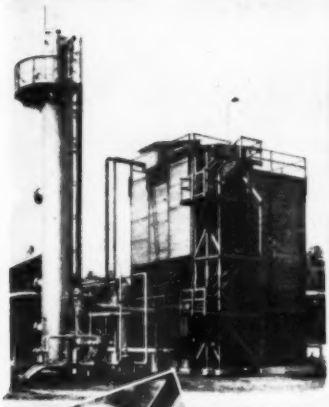
Plans now call for the reaming of holes to 30 in. in diameter over a length of 200 ft., approximately from 1,550 to 1,750 ft. This reamed portion will be filled with oil which will then be made highly viscous through the addition of gel-producing chemicals. As a further precaution compression joints will be added to the casing.

A further peculiarity in the complex movements is that in spite of the fact that Wilmington field is intensely faulted in the oil zones, there is no direct evidence that these fault lines are in motion. There are 900 wells in this field that pierce one or more faults. Of the 900 wells only 1 shows any damage or deformation. This would indicate that the fault lines are not the surfaces along which the movement takes place.

LONG BEACH OIL DEVELOPMENT CO. WELL IN THE "W" PARCEL

(Eastman drift survey made inside 8⅝-in. casing on March 9, 1949)

Depth (ft.)	Drift
Parallel to Original Hole	
1,439	16° 30′
1,527	16° 35′
1,550	16° 45′
1,575	16° 50′
1,590	16° 45′
1,600	16° 50′
1,610	17° 00′
1,615	17° 00′
1,618.5	17° 00′
1,619	17° 00′
1,619.5	17°
1,620	17° 10′
1,620.5	17° 30′
1,621	18° 00′
1,621.5	18° 00′
1,622	18° 20′
Dog-leg	
1,622.5	16° 15′
1,623	12° 20′
1,623.5	10° 00′
1,624	9° 15′
1,624.5	9° 25′
1,625	10° 40′
1,625.5	11° 30′
1,626	12° 35′
1,626.5	14° 05′
1,627	15° 10′
Parallel to Original Hole	
1,627.5	16° 05′
1,628	16° 30′
1,628.5	16° 40′
1,629	16° 45′
1,629.5	16° 50′
1,630	17° 05′
1,631	17° 15′
1,632	17° 15′
1,633	17° 15′
1,634	17° 15′
1,635	17° 15′
1,636	17° 15′
1,637	17° 15′
1,638	17° 15′
1,639	17° 20′
1,640	17° 20′
1,650	17° 20′
1,660	17° 25′
1,670	17° 30′
1,680	17° 30′
1,690	17° 30′
1,697	17° 35′
1,782	18° 20′



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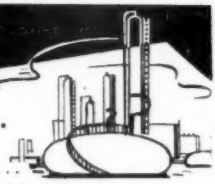

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Journal-Guide to FIELD PROCESSING

Discussion of Subject, With Insert Chart Accompanying This Issue

THE special 24 by 34-in. insert accompanying this week's issue of the Journal incorporates into a single package the story of field processing. On one side of the insert is charted a pictorial flow diagram with condensed descriptions of the numerous important operations in which petroleum is processed prior to its conversion into marketable products at refineries located generally remote from the production areas. The other side of the insert carries a list of selected references from recent issues of The Oil and Gas Journal. This bibliography is coordinated with the flow diagram and includes subjects on technology, design, operation, and construction of the various field processing operations.

Natural gas and crude oil either separately or together as indicated in the flow chart section of the insert ordinarily pass through one or more field processing operations at the well head. Separation of crude oil from natural gas and/or water is a widely employed field processing operation which along with treating comprises the initial field processing operations for more than 475,000 wells in the United States alone. Field stabilization of crude oil is another processing operation which is important to the economy of the industry. Like separating and treating operations with which it is frequently coordinated, stabilization is carried out immediately adjacent to the producing well.

Dehydration and Desulfurization

Dehydration and desulfurization of natural gas are also in the group of field processing operations which are performed usually in or near producing areas. Dehydration and desulfurization processes normally involve equipment and personnel comparable with refining operations. The ordinary plant installation includes sensitive control apparatus, heat exchangers, towers, and pumps to name a few of the equipment items.

Special-products plants in recent years have been finding an important place in the production branch of the petroleum industry. The function of these field processes vary widely depending on field conditions. For example, some companies find the operation of dry-ice manufacturing plants to be profitable ventures. Others operate at a profit field units for producing solid sulfur and a number of other byproducts which were heretofore discarded in petroleum field processing operations. This particular phase of field processing is relatively new and consequently its expansion is expected to progress rapidly in the next few years.

Natural-gasoline extraction, possibly the second oldest operation from a standpoint of field application, is today the most widely used of all field processing operations. Equipment and personnel employed in these operations parallel closely those of the normal refinery, but gasoline plants generally are operated in conjunction with producing activities.

Cycling plants, another field processing operation involving a large variety of equipment and relatively extensive operating personnel, employ all the equipment found in normal gasoline plants plus compression and attendant equipment for delivering the cycled gas back to producing zones. Because of the pressures involved many cycling plants are operated to extract liquid hydrocarbons by other than the absorption method generally employed in the average natural-gasoline plant.

Pressure Maintenance

Pressure maintenance, still another field processing operation, like cycling, is important to conservation. This operation is performed in a number of ways (refer to bibliography) and employs a wide variety of equipment depending on the particular application.

Gathering systems and pipe-line stations, broadly related operations, constitute still another group of field processes. Here equipment runs principally to prime movers, pumps, and recording and controlling instruments.

Because field processing installations are generally scattered over wide areas, field testing units are often relied on to supply laboratory service to plants and other field operations. This testing equipment is important in determining processing methods for petroleum production.

Petroleum research facilities now in use in the United States represent tremendous expenditures by operating companies. Located throughout the nation these facilities are employed continuously in the investigation and solution of problems in all divisions of the industry.

Personnel engage in operation of any type of field processing unit, as well as those indirectly associated with such activities, will find the bibliography and multiunit chart of particular value in coordinating the various field processing operations.

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Simplex vs. Duplex Pumps

What information do we need to decide whether to use a simplex pump or a duplex pump, and what are their efficiencies? What are the curves for such pumps, like the curves for centrifugal pumps?—F. A. C.

If steam pumps are used the duplex type are employed almost exclusively for refinery services, although for boiler feeds the simplex type of pump is widely used. Efficiency is not usually the basis of selection, even though the simplex pump has an efficiency around 10 per cent higher than a duplex pump. The selection of pumps is such a large field (see 11 references below all by the author and in The Oil and Gas Journal) that it cannot be discussed here.

For a given capacity or service, a simplex pump must have larger pistons or the speed at which the piston moves will have to be almost double that of a duplex pump. Of course, a twin-simplex arrangement of two simplex pumps side by side can be used. Aside from general considerations, the selection of a pump is done by formula.

$$D = \frac{12\,aPE_h}{231} = 0.0408\,d^2\,PE$$

in which

D = displacement of **one** double-acting plunger or piston, g.p.m.
a = area of plunger or piston, sq. in.
d = diameter of plunger or piston, in.
P = piston speed, ft. per minute
E_h = hydraulic efficiency

Assuming that we wish to handle 200 g.p.m. of water at 150-psi. pressure with 125-psi. steam, a suitable piston speed for a duplex pump would be about 60 ft. per minute (Ref. 11). However, note for freedom from repairs and for high efficiency, that a speed as low as 35 might be worth while. Thus, the displacement per cylinder (two for a duplex) is 200 divided by 2 or 100 g.p.m.

The piston diameter for a hydraulic efficiency of 90 per cent is:

$$D = 0.0408\,d^2\,PE_h$$
$$100 = 0.0408 \times 60 \times d^2 \times 0.9$$
$$d = \sqrt{45.3} = 6.75 \text{ in.}$$

A 7-in. piston would be used which would allow a slower piston speed.

A length of stroke of 14 in. would be satisfactory, and this would mean that the strokes per minute would be 60 divided by 14/12 or 51. This would be what a manufacturer would tend to supply, but again in the interest of maintenance, it might be advisable (Ref. 11) to ask for a longer stroke such as 18 or even 24 in. However, long-stroke pumps are uncommon because the purchase price is greater.

The steam end area is a function of the ratio of pressures (steam and liquid) and of the efficiency. For the 7 by 12 liquid end selected above, a mechanical efficiency (Ref. 4) of 78 per cent would be expected. Thus, the area of the steam cylinder would be:

$$7^2 \times \frac{150}{125} \times \frac{1}{.78} = 75.5 \text{ sq. in.}$$

and the diameter would need to be 8.71 in. or use 9 in. Thus, the pump would be a 9 by 7 by 14 duplex. This is not a common size and hence a selection would be made from pump catalogs, such as a 10 by 6 by 12 which would have excess capacity when operating at a high speed and would produce more pressure than required.

The **simplex** pump requires less floor space, it is efficient (even as high as 90 per cent), it has few parts, it will not short stroke, and it has closer clearance which means that it is suitable for hot liquids or vacuum service.

The **duplex** pump is cheaper, the discharge pressure does not pulsate as much as with a simplex, and it tends to short stroke because of the unequal friction of the packing. The inefficiency of the duplex pump is of little significance if the exhaust is used as process steam, and a duplex pump is used if it is roughly handled, exposed to the weather, or cannot be properly maintained.

No one ever speaks of the capacity curve of reciprocating pumps because they are substantially straight lines, i.e., as the speed increases the capacity increases in direct proportion. However, the curve is not entirely straight because the mechanical and hydraulic efficiencies are highest at slow speeds, and the utilization of the steam is most effective at high speeds.

References

(All in The Oil and Gas Journal)

1. Estimating Power Required for Pumps by Short-Cut Method, February 11, 1943, p. 43.
2. Steam Consumption of Reciprocating Pumps, March 11, 1943, p. 46.
3. Reciprocating-Pump Data, May 10, 1947, p. 99.
4. Reciprocating-Pump Calculations, Part I and II, May 17, p. 113 and June 7, 1947, p. 101.
5. Steam Consumption—Regular (I) and Power (II) Pumps, May 31, p. 273 and June 14, 1947, p. 131.
6. Suggestions on Pump Selection, July 26, 1947, p. 287.
7. Suction Lift of Pumps, August 2, 1947, p. 93.
8. Refinery Pump Services, August 23, 1947, p. 133.
9. Vacuum and Close Clearance Pumps, August 30, 1947, p. 103.
10. Pump Operation, September 20, 1947, p. 315.
11. Reciprocating Pump Speed, May 27, 1948, p. 90.

Water-Tank Corrosion

Our hot-water tank corrodes rapidly. What kind of a lining should we employ? R. P.

Perhaps the most economical way to maintain hot-water tanks is to clean them thoroughly at least once a year. Corrosion occurs mainly by pitting underneath the scale, and the removal of the scale eliminates, to a large extent, the entrapped oxygen that is the main corrosive agent.

The inside of the tanks can also be metallized with zinc. Deposits of this metal are not porous but about 12 passes or coats are required. Aluminum can also be used. Some operators find that the Ironhide metal paint of Pittsburgh Plate Glass Co. is effective. Of course, the surface should be thoroughly cleaned, and an inhibitive primer coat should be used before applying the main paint.

Octane Number of Catalytic Cracking

Which kind of catalytic cracking gives the best octane number? S. M. C.

The octane number by the several common processes, namely Fluid, Houdry, T.C.C., and Houdriflow, is very much the same particularly after the addition of tetraethyl lead. Conversion per pass has little effect, perhaps one or two units higher at high conversions. Likewise, the type of catalyst has little effect. In general, the synthetic catalyst gives higher octane numbers by one to two units (motor method) or two or three units (research method), although the somewhat new synthetic magnesium catalyst gives even higher octane numbers.

Temperature is the main factor, and its effect is somewhat as follows:

Motor Method

Reactor temp., (°F.)	Octane numbers — Clear — Synthetic	Clear — Natural	3cc. TEL — Synthetic	3cc. TEL — Natural
800	75	77	86	87
850	77	79	86	87
900	80	82	87	87
950	82	83	87	88

Research Method

800	81	84	92	95
850	87	89	95	97
900	92	93	98	99
950	94	96	99	100

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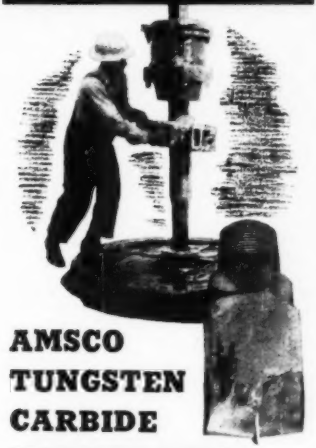

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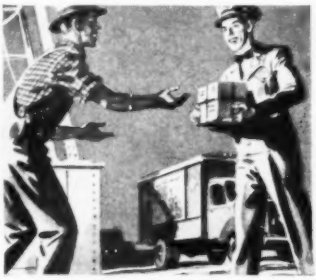

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BOOKS

SECONDARY RECOVERY OF OIL IN THE UNITED STATES. Second Edition, 1949. 650 pp. To be published by the American Petroleum Institute, 50 West 50th Street, New York.

It is proposed that the material to be included in this second edition will be greatly enlarged over that contained in the first edition. It would contain some of the material published in the first edition and in two supplements which have been issued. It is contemplated that 11 chapters will contain material not previously published. The edition will include a preface by Jake L. Hamon, A.P.I. vice president for production, and a foreword by Paul D. Torrey, chairman of the A.P.I. standing subcommittee on secondary-recovery methods. It is further contemplated that the second edition will contain 55 chapters (compared with 22 in the first edition), including a complete bibliography of the literature of secondary recovery, with subject, topical, and author indexes.

The actual cost of the printing, distribution, and sales expense of such a book would run several times the cost of the first edition. The Institute does not have the funds available at this time to make in 1949 large capital outlays for the publication of books where the return from sales would be deferred over a period of years. Therefore it has been decided to solicit advance orders, and to base the press run on the volume of such advance orders received. Price of the book will be determined by the size of the printing, from $8.50 per copy if sufficient advance orders are received to run an edition of 2,000 copies, to $20 per copy for an edition of only 500 copies. Those desiring to purchase one or more copies of the book are requested to contact with the A.P.I., indicating the number of copies desired.

PETROLEUM REFINERY ENGINEERING, third edition. By W. L. Nelson, June 1949, 6 by 9-in. page size, 830 p., 269 figures or illustrations. McGraw-Hill Book Co., New York. $9.00.

The Third Edition of this leading refinery book is larger by about 40 per cent despite the fact that some older material has been eliminated or consolidated. It appears to be directed much more toward practical plant operation than previous editions. It still contains, however, numerous computations or examples which are helpful to both students and plant engineers.

We of The Oil and Gas Journal feel that we can share in the pride of authorship because Prof. W. L. Nelson is our technical editor and because we find numerous references and at least 50 illustrations from The Oil and Gas Journal. The author is also head of the department of petroleum refining and chemical engineering of University of Tulsa, and he is active in consulting work.

The new edition contains unique material on the performance characteristics of products as a function of the laboratory tests. This has long been a particular interest of the author, and many of the new performance data probably came from the Quartermaster Petroleum School which was in operation at University of Tulsa during War II. Page 33 states: "Specifications are the result of a compromise between desirable performance characteristics in the product and the ability of the refiner to make such a product from the crude oil at hand. Thus, the whole operation of refining should be governed by the performance of the product when it is finally used."

The chapter on the evaluation of crude oils and oil stocks is greatly enlarged. Similar material is not, to our knowledge, available elsewhere except in scattered magazine articles. Likewise, the new chapter on catalytic cracking provides engineering information and yield data not available in other books. The chapter on physical properties has been brought completely up

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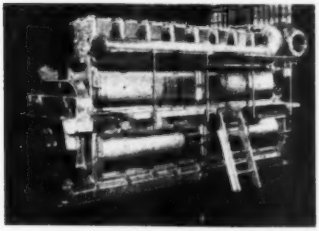

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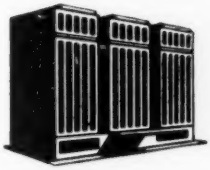

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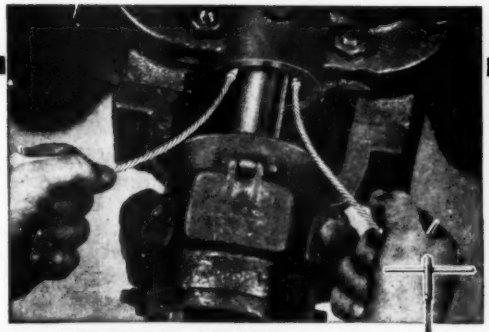

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to date and it continues to be the best source of complete information.

The chapters on hydraulics, combustion, vaporization, and general engineering are directed more completely toward the petroleum industry than in the old editions. The information appears to come from plant operation rather than theoretical or schoolbook considerations.

The treatment of the fouling of heat exchangers is extensive. The author states that fouling dirtiness factors are more important than any other heat-transfer information. A serious omission in the Second Edition was corrected in the Third Edition by introducing the now widely used Lobo-Evans method of designing pipe stills.

More material might have been included on the processes of alkylation, polymerization, chemical manufacture, isomerization, etc., but there are 46 pages in the chapter on rebuilding hydrocarbons.

The titles of the chapters are:

1. Chemical Engineering and Petroleum Engineering
2. History and Development of Refining
3. Composition of Petroleum
4. Refinery Products and Test Methods
5. Evaluation of Oil Stocks
6. Physical Properties of Petroleum Oil
7. Introduction to Processing
8. Refinery Corrosion and Metals
9. Refinery and Distillation Processes
10. Auxiliary Processes and Operations
11. Conventional Chemical Treatments
12. Solvent Treating or Extraction Processes
13. Dewaxing
14. Fluid Mechanics
15. Combustion
16. Vaporization and Condensation
17. Fractionation and Towers
18. Heat Transfer and Exchangers
19. Tube-still Heaters
20. Thermal Cracking and Decomposition Processes
21. Rebuilding Hydrocarbons
22. Catalytic Cracking
23. Natural Gas and Natural Gasoline
24. Economics of Design
25. Typical Design Calculation

The book contains numerous references and lists of related articles at the end of each chapter. It is not easy to read but it contains an enormous amount of information and it should continue to lead the field of petroleum refining books.

Copies may be secured from the Book Department of The Oil and Gas Journal, 211 South Cheyenne, Tulsa.

UNIFIED AND AMERICAN SCREW THREADS FOR SCREWS, BOLTS, NUTS, AND OTHER THREADED PARTS. Published by American Society of Mechanical Engineers, 29 West 39th Street, New York. 99 pp.

This standard was approved by the American Standards Association on February 3, 1949, and is the American fulfillment of the Declaration of Accord with respect to the Unification of Screw Threads signed at Washington November 18, 1948, by British, Canadian, and American representatives. The standard contains tables for the limits of size for all standard threads and certain selected diameter-pitch combinations of special threads based on nine pitches length of engagement. The standard thread covers a strong arm to defense in wartime and a boon to international trade in peace.

THE FIRST SCIENTIFIC ANALYSIS OF PETROLEUM. With an introduction by Paul H. Giddens. 24 pp. $1.25.

This is a facsimile reprinting of Prof. Benjamin Silliman's famous "Report on Rock Oil, or Petroleum, in Vanango County, Pennsylvania," published in 1855, a chemical classic that touched off the petroleum industry. It is reprinted in connection with the ninetieth anniversary of the petroleum industry. Copies may be ordered from Paul H. Giddens, Allegheny College, Meadville, Pa.

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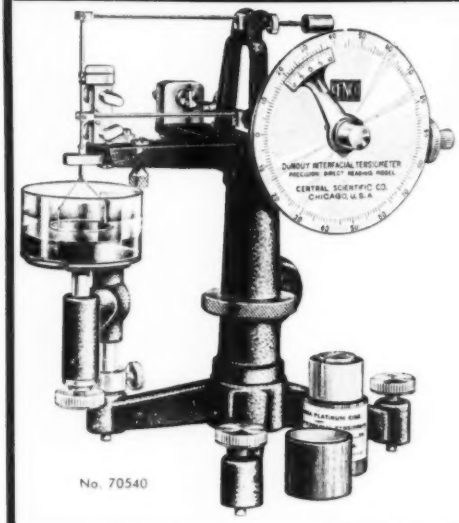

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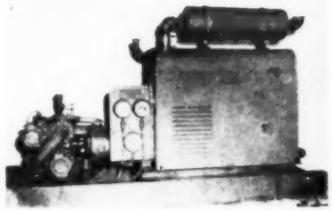

This unit consists of one 3 inch 2-stage Byron-Jackson "PUP" Pickup Centrifugal Pump—3 inch Suction and discharge, 4 inch Adapters for couplings, 200 BPH at 680-feet head or in parallel 400 BPH at 340 feet head, direct connected to Chrysler Model C-36 (Ind.-9)—Industrial 8-cylinder Engine, Skid Mounted. Wt. 4060 lbs. Skid length 9 feet 6 inches. Height 62 inches, Width 29 inches.

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	2200	155	590
	2400	185	650
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	2400	360	325

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ENGINEERING *fundamentals*

Use of Equilibrium Constants

THE computation of the phase state of a given hydrocarbon mixture at a given pressure and temperature is of significance in petroleum-production calculations. Such computation is desirable to designate what phases are present in a reservoir, to compute the proper pressures and temperatures at which to separate the production stream at the surface, and to estimate gasoline recovery.

Such computations are based upon equilibrium constants. In using these constants one must assume that the process in question is an equilibrium one.

By definition this equilibrium constant is known as k in the expression $k = y/x$, where y = the mol fraction of the component under discussion in the vapor phase and x = the mol fraction of the same component in the liquid phase. It expresses, in other words, a balance between the liquid and gaseous phases.

Similarly an equilibrium may exist between any different phases in a hydrocarbon system, i.e., between vapor and liquid, between liquid and solid, or between vapor and solid. For the purpose at hand, the main interest is in the transition between vapor and liquid, inasmuch as this transition is the one controlling the particular items mentioned above.

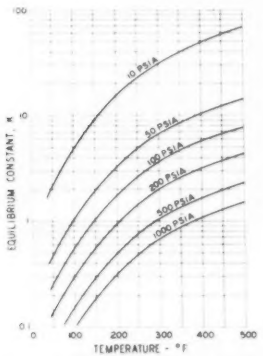

Fig. 1—Typical variation of equilibrium constant with pressure and temperature at low pressures. (Adapted from Reference 1 for butane)

Each individual component in a given hydrocarbon system has its own equilibrium constant. Furthermore, the value of k for a given component is dependent upon the pressure and temperature to which the system is subjected. In general, for the paraffin hydrocarbons the value of k decreases with the complexity of the molecule, or as one goes up the homologous series. For a given hydrocarbon component the value of k generally increases with increase in temperature. It decreases with increase in pressure at low pressures and increases with increase in pressure at high pressures.

The equilibrium constant is a measure of the ability of a particular component to vaporize, in relation to all other components in a mixture. Vaporization is dependent upon the forces between molecules existing in a system. Therefore, an equilibrium constant is applicable in its strictest sense only to one specific mixture. In other words, the equilibrium constant for propane in a 45° A.P.I. oil at a given pressure and temperature would differ from the equilibrium constant for propane in a 40° A.P.I. oil at the same pressure and temperature. As a matter of practical application, however, it is common to assume that an equilibrium constant for a specified component at a specified temperature and pressure is the same for any mixture. The assumption is often justified because of the small variation of the constant between different mixtures, but the main reason for the assumption is that sufficient detailed measurements of equilibrium constants have not yet been made to permit an extensive correlation.

There is now available in the literature an increasing number of equilibrium constant charts. A common method of presentation is to plot log k versus temperature by constant-pressure lines. The Natural Gasoline Supply Mens Association Handbook[1] carries charts on the equilibrium constants for hydrocarbons up to hexane for pressures ranging to 1,000 psia. and for temperatures up to 500° F. In the literature other charts can be found for certain reservoir mixtures or modifications at higher pressures,[2,3,4,5] but at present there has been no publication correlating the data at higher pressures with A.P.I. gravity, gas-oil ratios, etc.

As a matter of illustrating the variation of equilibrium constants, two graphs from literature sources[1,2] are given here. Fig. 1 is a simplified equilibrium constant chart for butane taken from Reference 1. Fig. 2 is a simplified equilibrium constant chart for components in a mixture similar to a crude oil over a wide range of pressures at constant temperatures. This figure shows the reversal of the decreasing trend with pressure and the convergence of equilibrium constants as the critical pressure is approached.

It is the purpose of this discussion merely to call attention to the initiate of the existence of equilibrium charts and their use in calculations. For details and accurate charts over wide ranges the reader is referred to listed references.

References

1. Natural Gasoline Supply Men's Association Technical Manual (Fifth Edition), Natural Gasoline Association of America, Tulsa.
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3. Sage and Lacey, Volumetric and Phase Behavior of Hydrocarbons, Stanford University Press.
4. Jones, Petroleum Production, Vol. 1, Chapter 9, Reinhold Publishing Co.
5. Roland, Smith, and Kaveler, The Oil and Gas Journal, March 27, 1941

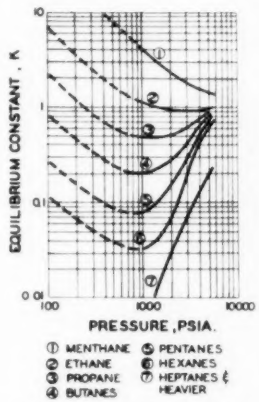

Fig. 2—Equilibrium constant chart for components in a mixture of 49.9° A.P.I. oil with a natural gas in the ratio of 3,660 cu. ft. per barrel at 120° F. (From Standing and Katz, Vapor-Liquid Equilibria of Natural Gas-Crude Oil Systems, Fig. 7, A.I.M.E. Trans. 1944, Vol. 155)

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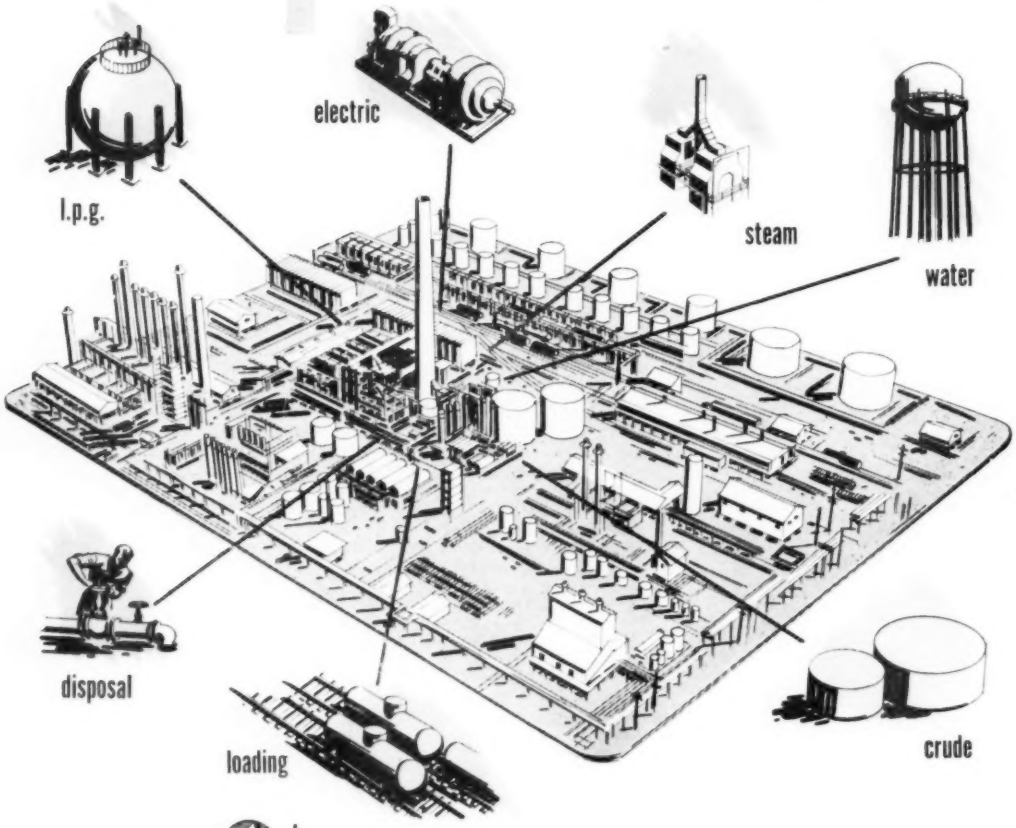

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Cost-imating

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Pipe-Line Construction

THE operating costs of pipe-line pump or compression stations is also discussed in References 4, 6, and particularly Reference 5. Reference 5 (Federal Power Commission) also presents information on the cost of gas-distribution systems as investment per customer.

TABLE 1—MISCELLANEOUS PIPE-LINE COSTS, 1946

Item—	Unit	Material	Labor	Total	Ref.
Right-of-way (easement)	$/mile			247	1
Land or land rights (gas companies)	(2.7 per cent of total investment)				5
Surveying	$/mile		41	41	1
Clearing of right-of-way	$/mile		21-206	21-206	1
Total surveying, clearing, and right-of-way	$/mile			800-1,650	2
Hauling and stringing	ct./ton mile		30	30	1
Laying pipe, per inch diameter	$/mile		80	80	1
Ditching—hand—24-in. depth*	$/mile		960	960	1
Ditching—machine—24-in. depth	$/mile		560	560	1
Freight on pipe (f.o.b. mills)	$/ton	15-30		15-30	2
Telephone system	$/mile			667	2
Pipe cost	$/ton	94-118		94-118	2, 3
Inspecting	$/mile		80	80	1

*Including backfill.

TABLE 2—COST OF PIPE LINES, 1946 PRICES

Diameter (in.)	Oil lines,* $/mile			Gas transmission, total*		Gas-field lines, total*	
	Pipe	Labor	Total	$/mile	$/mile per inch diameter	$/mile	$/mile per inch diameter
2						3,200	1,600
3						4,200	1,400
4	1,100- 2,400	1,050- 1,930	2,150- 3,930	6,000	1,500	5,200	1,330
6	2,800- 5,200	2,460- 4,040	5,260- 9,240			8,300	1,390
8	5,100- 8,100	4,400- 7,000	9,500-15,100	12,000	1,500	11,800	1,470
10	7,300-12,700	6,500-10,000	13,800-22,700			15,000	1,500
12	11,000-17,200	9,300-14,000	20,300-31,200	18,500	1,550	18,300	1,520
14	14,500-23,000	11,900-18,100	26,400-41,100				
16	18,300-29,600	15,400-22,800	33,700-52,400	25,500	1,600		
20				33,000	1,650		
24				41,000	1,700		
26				45,000	1,725		

*Does not include land or land rights.

TABLE 3—STATION INVESTMENTS, 1946 PRICES

Item	Unit	Material	Ref.
Gas-transmission stations:*			
Structures and improvements	$/hp.	32-46	5
Equipment	$/hp.	136-174	5
Total or complete	$/hp.	170-210	5
Total or complete	($55,000 plus $160 per hp.)		6
Total or complete	(20-25 per cent of total system)		2
Gas measurement and regulating	(0.6 per cent of total investment, range for average plants is 0.2-0.8 per cent)		5
Gas-field compressors or stations*	$/hp.	110-137	5
Oil pump stations:			
Installed hp. 200	$/hp.	500	3
400	$/hp.	350	4
800	$/hp.	300	4
1,600	$/hp.	260	4
2,400	$/hp.	240	4
3,200	$/hp.	228	4

*See also Table 1 of Cost-imating No. 36, June 23, 1949, concerning compressor stations.

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1. Bignell, The Oil and Gas Journal, December 17, 1936, p. 52.
2. Davis & Terry, The Oil and Gas Journal, January 1, 1931, p. 117.
3. Author's files.
4. Wolf, Oscar, Economic Design of Oil Pipe-Line Transmission Systems, Pet. Mech. Eng., (A.S.M.E.), p. 123, 1930.
5. Federal Power Commission, Natural Gas Company Costs Units, FPC, S-54, 1945.
6. Biddison, The Oil and Gas Journal, May 14, 1931, p. 25.

No. 44 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

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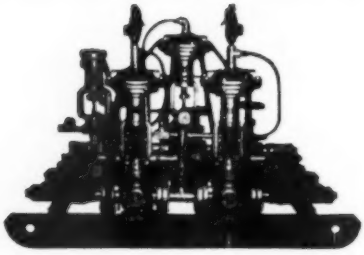

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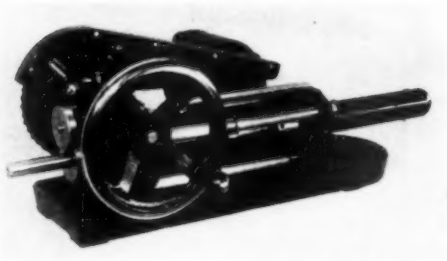

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by Dan B. Miller

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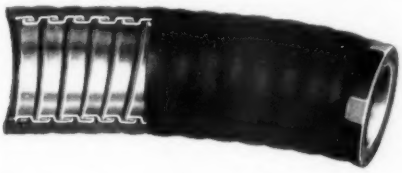

and dirt. Sealtite's ease of installation, and the fact that it is easy to clean make it an asset to the appearance and continuous operation of modern machinery and equipment. The lining of Sealtite is square-locked galvanized steel, flexible tubing. A smooth synthetic jacket is extruded over the lining to make an abrasion-resistant, moisture, and oil-proof conduit which is bendable to small radii. Available in long lengths to be cut and assembled on the job. Foolproof bushings, used to assure ground contact between the metal lining and the fittings, are packaged separately in standard quantities. *American Brass Co.*

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(3) RELIEF VALVE DISK relieves excessive pressure caused by thermal expansion, by automatically relieving bonnet and line pressures as they occur, saving petroleum and repair time and money. Just replace the disk of your present single-wedge gate valve with relief valve disk. Adaptable to all single-wedge disk valves. Original manufacturer disks are used to make this relief disk. Standard relief pressures are factory set at 40 psi. or any other pressure you may require. *Paul McMurry.*

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(4) CASING CENTRALIZER affords the maximum centering force that can be applied to the casing during hole conditioning and centering operations. In addition, this device permits free rotation of the casing in order that rotational wall scratchers may be used most effectively, as well as reversible wall scratchers when the casing itself is to be reciprocated in the hole. It has the flexibility of a long-spring-type centralizer, and the stiffness of a short-spring-type centralizer. In combining various design factors it was found necessary to provide a minimum of three sizes of springs for each popular size of casing up to and including the 8⅝-in. size. *Baker Oil Tools, Inc.*

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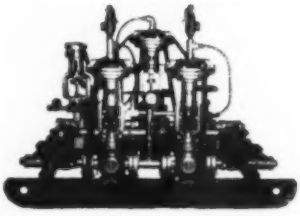

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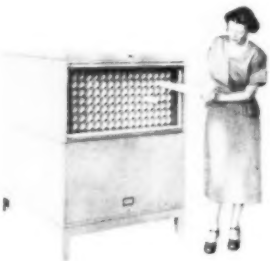

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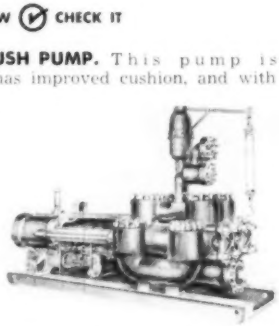
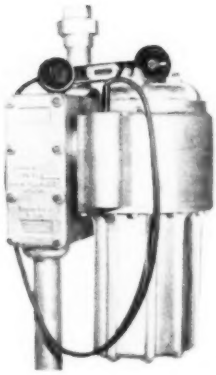
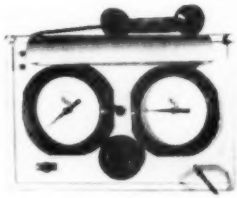
(7) DUPLEX STEAM SLUSH PUMP. This pump is smoother in operation, has improved cushion, and with the same steam consumption gives higher pressure and more mud. Steam and exhaust piston valves are below the steam cylinders. Every stroke of the piston drains and blows all condensate, scale, or rust down and out of the cylinder. This construction increases the efficiency by 12 to 15 per cent. This pump will maintain its stroke at a slow speed. Fully enclosed rocker shafts are mounted on ball bearings and valve links operate in oil. The fluid end has no threads of any type in the mud stream. It is easy and quick to get into, yet it is strong. Four nuts on outside of pump holds the head. For full accessibility to liners one has only four nuts to remove. Chain hoist is standard equipment. *Wheland Co.*



IT'S NEW CHECK IT





(8) DOUBLE SELSYN selective tank gage receiver and transmitter. The receiver is equipped with a power switch and a selector switch for selecting tank to be gaged. Permits reading of any tank in a group, on one receiver, in both feet and inches and fractions thereof. Transmitter employs high-accuracy Selsyn motors. Features low maintenance, easy service, and high accuracy. *Roach Equipment Manufacturing Co.*

IT'S NEW CHECK IT

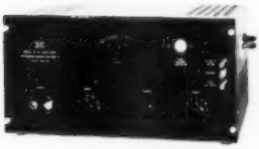
(9) HOLE DIGGER features, among other improvements, the raising, lowering, and leveling of the derrick hydraulically. New hydraulic system permits leveling with a 30 travel to either right or left on an axis parallel to the axle of the truck on which the digger is mounted, enabling the operator to adjust his derrick for true vertical digging from a truck parked on sloping ground. An additional new feature is a reverse mechanism for the auger, to be used when it is necessary to back the auger out of the hole. *Hugh B. Williams Manufacturing Co.*

IT'S NEW CHECK IT

(10) 18 AND 24-IN. WIDTHS OF TAPECOAT to round out a line of protective coatings in tape form have been developed. Addition of the new widths will give a utility range that will serve practically any protective coating requirement in the field, from the smallest job to the largest. The new wide Tapecoat is particularly adapted for coating field joints on large-diameter pipe, protection of large bends, wrapping mechanical couplings, and patching transmission lines. *Tapecoat Co.*

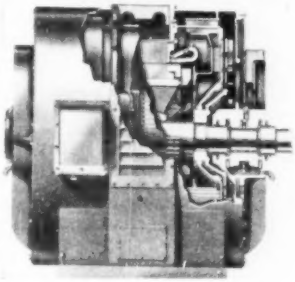
IT'S NEW CHECK IT

(11) MODEL "M" OSCILLATOR was developed to meet the exacting demands of geophysical-research laboratories. It features a circuit which has no lower limit to its possible frequency of oscillation. Other features of the instrument include: extremely low distortion; extremely high calibration accuracy; power frequency comparator; highly accurate, fixed-frequency, crystal plug-in units; unusually wide frequency range; unusually high output; and electronically regulated power supply. *Southwestern Industrial Electronic Co.*



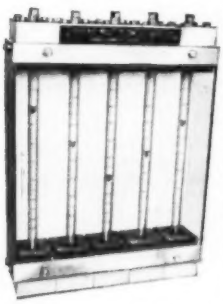
IT'S NEW — CHECK IT

(12) COPPER-FIN, TOTALLY ENCLOSED, INDUCTION MOTORS. Rapid conduction of heat from the stator is accomplished by interleaving circular copper punchings at intervals among the core laminations. These copper fins extend beyond the core iron so that the heat picked up can be transferred to the external cooling air. Additional copper fins are fabricated with steel parts to form large, cylindrical heat exchangers at both ends of the motor around the end turns. Heat picked up by internal air circulating through the rotor is transferred through these heat exchangers to the external cooling air. Available in large ratings up to approximately 1,500 hp. at 1,800 r.p.m. *Westinghouse Electric Corp.*



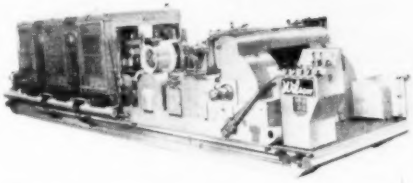
IT'S NEW — CHECK IT

(13) BROOKS MULTIFLOW ROTAMETER is a new multitube rotameter which can be built with two or more rotameter tubes in it for use on related flows. Advantages of this unit are: compactness, close correlation of related flows, and economy, since it costs less than the same number of individual rotameters. The Multi-Flow rotameter is proving very effective for such applications as reflux and product in a continuous still, gas and air flows to an atmosphere furnace, water to a battery of coolers, continuous dilution, continuous purging, and feeds to parallel filters, and other services where two or more flows have a direct relationship to each other. *Brooks Rotameter Co.*



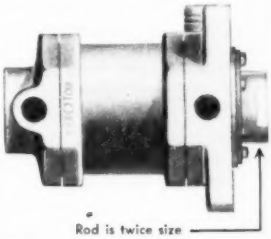
IT'S NEW — CHECK IT

(14) GIANT TORCAIR RIG. A medium-depth rig with torque converter drives on either one, two, or three engines, is rated to depths of 7,500 ft. with $4\frac{1}{2}$-in. drill pipe and 9,000 ft. of $3\frac{1}{2}$-in. drill pipe is used. Measuring 30 ft. long; 6 ft., $11\frac{1}{2}$ in. high, and 10 ft. wide with the breakout and spinning catheads removed, the Torcair retains all roadability features. Air-tube disk clutches are used on drum drives, pump drives, high and low-speed drives, and master clutch. With greater torque capacity, air-tube disk clutch offers convenient remote control and requires but small manual pressure for full torque. It is possible to set the brake to register as low as one-half point on the weight indicator. *Wilson Manufacturing Co.*



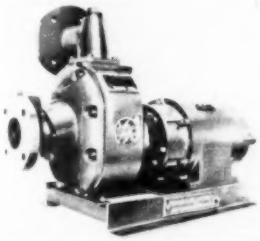
IT'S NEW — CHECK IT

(15) CUSHION CYLINDERS. Improved type of cushioning for its series 100 cylinders of 150-psi. air and 300-psi. oil capacity. The new design provides effective cushioning of the piston stroke by comparison of the displaced air or fluid. Cushion cylinders are standard cylinders employing cushion units. A cushion plate attached to the cylinder cover blocks off the flow of exhaust air or fluid when a cushion bushing attached to the piston rod enters this mating cushion plate. The air or fluid displaced by the movement of the piston is thus compressed and metered out through adjustable needle valves, thereby cushioning the piston during the remainder of the stroke. *Gerotor May Corp.*



IT'S NEW — CHECK IT

(16) SELF-PRIMING CENTRIFUGAL PUMPS. The recently amplified line contains 26 basic series of pumps which in turn are available in virtually endless modifications and combinations of mountings, fittings, and materials. Design changes on the basic models include such improvement as a new cover plate engineered for increased strength and for appearance, flanged suction and discharge connections, and improved suction check valve. Included in the new line are electric horizontal long-coupled and vertical and horizontal close-coupled models, portable, and stationary engine-drive and belt-driven models. *Marlow Pumps.*



TRADE LITERATURE

(17) A-33-6 is a pamphlet describing a new pumping unit smaller than any previously manufactured by the company. Construction features and specifications of this 9 to 14-in. stroke pump are completely covered in data table. *Alten Foundry & Machine Works, Inc.*

(18) P & H DIESEL POWER, a well-prepared and well-illustrated, six-page multicolor brochure, contains performance charts, complete specifications, mounting dimensions, and outstanding features of Model 687-C two-cycle diesel engine. *Harnischfeger Corp.*

(19) DROP-FORGED STEEL FLANGES is a 32-page booklet made up of engineers' data sheets illustrated with blueprints and halftones of each type of flange offered. Also included are tables on chemical requirements, Brinell hardness, and service pressure ratings for carbon-steel flanges at 850° and 1,000° F. *Harrisburg Steel Corp.*

(20) PIPE AND PIPE FABRICATION, a new four-page reference folder on pipe and pipe fabrication. Complete information is given on pipe sizes, prices, weights, and dimensions. *L. B. Foster Co.*

(21) GUNITE CONCRETE. A 28-page book setting out the advantages, physical characteristics, and applications of Gunite concrete in new construction, overcoating, and repairing. There are six pages devoted to engineers' specification sheets on typical applications. *Gunite Concrete & Construction Co.*

(22) FANMIX GAS BURNERS. Bulletin 410-6 is a 16-page book containing illustrations and sectional line drawings of each burner listed. Includes a section on burner sizes, selection, design and application, and advantages. *Coppus Engineering Corp.*

(23) HYDRAULIC ACTUATING CYLINDERS for operation of gate valves are discussed in this technical bulletin. Application of these cylinders to hot oil lines in refinery work is covered, along with cylinder details and installation information. *Ledeen Manufacturing Co.*

(24) LIQUID-LEVEL GAGE CATALOG. In addition to information on models, list prices, and dimensions, it contains considerable technical data that will be helpful to anyone concerned with liquid-level gages. *Penberthy Injector Co.*

(25) FOAMGLAS, THE PERMANENT INSULATION. In addition to illustrations of its many applications, this 24-page book includes data sheets on material classification, essential characteristics, source, can coverage; details for insulating vertical and horizontal tanks; properties of Foamglas, a thermal conductivity chart, and details for insulating ducts, removable covers, and tank heads. *Pittsburgh Corning Corp.*

(26) EXPAND-X EXPANDED METAL is a 28-page book illustrating and describing the industrial applications of Expand-X, Grate-X, and accessory items for easy assembly. Data sheets on each variety are included. *United States Gypsum Co.*

(27) TRAILERIG. This eight-page catalog completely describes and illustrates this new development in completely portable self-contained drilling equipment. *Cardwell Manufacturing Co., Inc.*

(28) IDEAL DRILLING MUD MATERIAL is a bulletin describing the unusual properties of Wyo-Jel, a special drilling mud material. It contains all essential data and application information and includes results on rotary mud tests. *Wyodak Chemical Co.*

(29) PERFORMANCE AND ECONOMICS OF REDA PUMPS IN WATER-DRIVE RESERVOIRS presents general lifting cost data for several sizes of casing, recovery graphs, and case histories in five pools in the Southwest. *Reda Pump Co.*

(30) CONTINUOUS AUTOMATIC CAUSTIC DILUTION. This eight-page dossier includes flowgrams, and a dilution table and chart, along with an explanation of what the diluter does and its operation. *%Proportioneers, Inc.%*

(31) CABLE-TOOL CATALOG. In addition to carrying a complete size and part list, this illustrated, 10-page catalog gives complete details on all equipment. *Acme Fishing Tool Co.*

(32) AUDCO VALVES FOR OIL FIELDS AND REFINERIES. This 40-page catalog gives photographs, sectional line drawings, complete dimensions and capacities, applications, materials, and list prices on each valve offered. *Audley Engineering Co., Ltd.*

(33) WELL SURVEYING, an eight-page catalog describing and illustrating the specialized instruments of the company and specialized services to the oil industry. The following instruments and services are covered: surwel underground surveying service; E-C survey service; polar core orientation; Johnson elevation meter; E-C inclinometer; Syfo clinograph; nonmagnetic drill-collar rentals; measuring line hoist rentals; and teleflood meter. *Sperry-Sun Well Surveying Co.*

(34) REVISED EDITION OF GUIDEBOOK covering applications of hard-facing alloys in heavy industry provides detailed information on the choice and application of various hard-surface metals commonly used in heavy construction. *Stoody Co.*

(35) CIRCULAR 101. A new folder describing the bronze globe and angle valves with renewable composition disks, is well illustrated with photographs of all the important construction features of this line of valves, recommended for services up to 150 lb. steam or 300 lb. cold water, oil, air, or gas. *Kennedy Valve Manufacturing Co.*

(36) MEN, FACILITIES, AND KNOW-HOW. This attractive 24-page brochure illustrates by photographs and sketches the complete story of Koven's experience, knowledge, and facilities in the field of metal fabrication. *L. O. Koven & Brother, Inc.*

IT'S NEW ✓ CHECK IT

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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Proper Safety Measures Help Avoid Crankcase Explosions

Although rare, these accidents do occasionally occur — here's how to reduce their damage

by Ralph L. Boyer*

IT would be a bold exaggeration to state at this time that crankcase explosions can now be entirely eliminated. Provisions, however, are being made to assure adequate protection for both equipment and personnel against serious damage or injury should such an accident occur. Intensive research on the subject of crankcase explosions has produced several interesting and highly important findings.

Perhaps the greatest difficulty in getting precautionary measures adopted by engine operators is the very fact that so few explosions have occurred. An operator who owns anywhere from one to over a hundred engines and who has operated his equipment for 20 years or more without the slightest sign of a crankcase explosion, is not likely to get excited about precautionary measures. The fact remains, however that he is just as likely as anyone else to have such an accident.

The possibility of crankcase explosion is not limited to the diesel engine. It can occur on a gas, gasoline, or even a steam engine. As a matter of fact, it is equally possible to have just such an accident in any gear case or other type of machinery that is reasonably well enclosed and has lubricating oil within it.

Causes of Explosions

Primary cause of a crankcase explosion is generally the overheating of a bearing, bushing, piston, or other part which has reached a high temperature due to some form of seizure. If the lubricating-oil vapor becomes mixed with air in a combustible ratio within the vicinity of such a mechanical failure, then a fire or explosion will likely occur. Many operators can immediately call to mind the occurrence of hot spots without having experienced an explosion. The reason for this is a simple and very fortunate one. The fact is an oil vapor and air mixture in a totally enclosed housing is normally too rich to ignite or propagate a flame.

Many operators can remember one or more instances when black smoke billowed from an engine breather. This indicated the presence of mild combustion taking place in the immediate vicinity of the hot spot. However, the flame could not progress throughout the crankcase because the oil-air mixture was too rich. From these facts it is easy to understand why the chances of getting both a hot spot and an explosive mixture at the same time are very remote. This point alone probably accounts for the fact that crankcase explosions are so extremely rare.

In view of the above conditions, the first precaution against explosion becomes apparent. Since a crankcase mixture is normally too rich to propagate a flame, it is important that no air be supplied to the crankcase. The practice of ventilating the crankcase by a forced draft or otherwise encouraging air to filter in and around the crankshaft or other open spots, should be avoided. An engine crankcase must, of course, breathe to the atmosphere since there is always a certain amount of gases that blow by the piston. The best known practice is to have a crankcase breather through which the accumulated gases can escape, preferably by natural draft.

Wait After Shutdown

The second precaution, even more important than the first, is to wait at least 10 minutes after a shutdown before opening any crankcase cover. A careful study of crankcase explosions shows that in most instances where the operator was injured or even killed, he was in the process of removing a crankcase cover. The reason for this is obvious. Since a crankcase mixture is normally too rich to burn, there probably was no explosion, perhaps no more than a small fire in the crankcase before the cover was removed. The operator, however, being aware of some mechanical disarrangement, would be inclined to get the crankcase opened as soon as possible after shutting down the engine. As the crankcase cover was being removed, a large amount of air suddenly admitted into the crankcase sufficiently leaned the mixture to a point where it became explosive. Since the operator was in the act of removing the cover, he was in the direct path of the violence resulting from the explosion.

The most important knowledge for any operator to possess is that if at any time he notices any internal-mechanical trouble which may cause him to shut down his engine, under no condition whatsoever should the crankcase cover be removed for at least 10 minutes. Although a localized hot spot generally cools off very quickly (perhaps 1 minute is a safe estimate), we believe in the interest of safety the best rule to follow is to wait for a period of 10 minutes or more.

Since it is the inrush of air following a minor explosion that produces a hazardous condition, the use of blowout doors decidedly fails as an adequate guard against explosion damage. Most engine builders at one time or another have used gasket or blowout doors as a protective means. In the event of an explosion, the gasket would rupture, relieving the force of the explosion. Unfortunately the minor explosion within the crankcase would easily blow out the gasket arrangement which, in turn, would permit an inrush of air and set the stage for a major explosion.

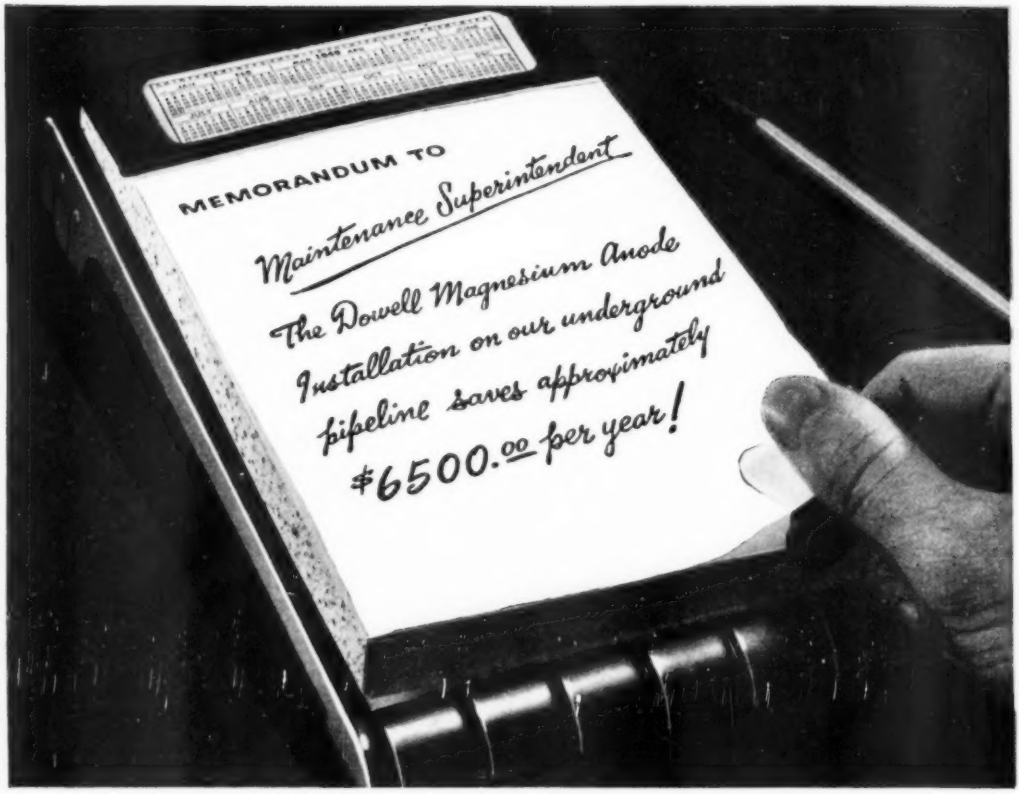
Explosion-Relief Doors

It is now possible, however, to provide explosion-relief doors that adequately protect the crankcase from minor explosions and do not permit the disastrous inrush of air. Several designs of explosion-relief doors have already been perfected and are presently available to engine users.

We believe these explosion-relief doors should be made of extremely light-weight strip valves, so that they may react instantaneously without the effect of heavy inertia in the valve. Since this type of valve is never completely oil tight, the usual gasket blowout is provided on the outside of the strip valves. In the event of a crankcase explosion, the gasket arrangement blows out and has to be replaced. However, the strip valves in the meantime react instantly to prevent an inrush of air, thus eliminating the principal cause of the major explosion. By properly sizing these valves with respect to the crankcase volume, the maximum pressure reached in the most violent explosion can be kept well under 15 psi. This pressure, of course, will not normally cause any damage. We are now, and have been for some time, supplying explosion-relief doors on all gas and diesel engines. Designs have also been developed, and are now available, to provide similar protective means for any field installation not originally so equipped.

Once again, there probably isn't one chance in a thousand that there will be a single accident in the thousands of engines operating today. However, we believe it wise policy on the part of every operator to exercise every precaution by making adequate provisions for the one occurrence that might happen.

*Vice president and chief engineer, Cooper-Bessemer Corp.



To combat a serious corrosion problem on 79 miles of pipelines, a large mid-western processing company initiated a program of cathodic protection. Dowell magnesium anodes were installed at each leak point and on all new lines as they were laid. The leak rate was cut from 145 in the pre-protection year of 1943 to only 45 leaks in 1946 and 54 in 1947. The $12,400 installation cost has been saving about $6,500 each year in maintenance costs alone!

The degree of protection afforded to buried metal structures by a system of Dowell magnesium anodes will depend on the soil conditions encountered and the number of anodes installed. Carefully alloyed to specifications designed to insure maximum life and efficiency, Dowell magnesium anodes require no external source of power and have proved to be an effective and economical way to control underground corrosion.

A subsidiary of The Dow Chemical Company—pioneer in the use of magnesium for corrosion control—Dowell offers the extensive research facilities and technical knowledge that make it your logical source of magnesium anodes. Write directly to Tulsa for additional information.

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FREE SHOWING!

Now available—a new 18-minute sound slide film illustrating the possibilities of Dowell magnesium anodes for corrosion control. A Dowell representative will gladly arrange a special showing at your plant, office, or organization meeting. Call or write Dowell today.

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MAGNESIUM ANODES

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PIPE LINES

Details Announced for Great Lakes Expansion

GREAT LAKES PIPE LINE CO. has announced construction details on its proposed $37,500,000 expansion program, including 931-mile, 12-in. line along existing routes from Ponca City and Tulsa, Okla., to Minneapolis, and a 45-mile, 8-in. line from Cushing, Okla., to Tulsa.

The 12-in. line will be built through Kansas City, Kans., Des Moines and Mason City, Iowa, to Minneapolis and from Kansas City to Omaha. The 45-mile, 8-in. line will run from Cushing through Drumright, Okla., to Tulsa. Twelve pump stations and six delivery terminals will be enlarged.

Harry Moreland, president of the company, said that every effort will be made by the company to attain a system capacity increase which will provide a degree of relief in the transportation effort this fall and winter to supply burning oils to northern terminals.

The first section of the 12-in. line will be laid between Des Moines and Minneapolis, and dependent upon weather and other factors is expected to be completed by December 15. Capacity will then be increased 200,000 bbl. a month to Minneapolis. While this section is being laid, work will go forward on construction of the 12-in. line from Des Moines southward to Ponca City and Tulsa; the 8-in. line from Cushing through Drumright to Tulsa; larger connecting lines at refineries; enlargement of facilities at main-line pump stations; and expansion of terminals in these sections.

Plans call for enlargement of pumping stations at Cushing, Tulsa, Drumright, Ponca City, and Barnsdall, Okla.; Humboldt and Kansas City, Kans.; Ridgeway, Mo.; Des Moines and Latimer, Iowa; Faribault, Minn.; and Falls City, Neb.

Terminal tankage, piping, and motor-transport loading facilities will be expanded at Kansas City, Kans.; Des Moines and Mason City, Iowa; Mankato and Minneapolis, Minn.; and Omaha.

As lines will be completed in advance of permanent pumping facilities, temporary pumping units will be installed. With these in operation on the new lines, a total monthly system improvement of 1,000,000 bbl will become available February 1, 1950.

Delivery of the 12 in. pipe for the Kansas City-Omaha section is expected to be made during the first quarter of 1950, and will be stockpiled so that construction can begin as soon as possible next spring. When the program is finished the company expects to be transporting 50,000,000 bbl. of products per year.

Ultimate goal of the company, Moreland said, is line capacity sufficient to move all the products manufactured by shipper-refiners for the territory served by Great Lakes.

The firm's announcement of its expansion follows by less than 4 years the start of a similar program in the summer of 1945. Results of that $30,000,000 project were an increased capacity of 50 per cent and a major extension to the system with a line from Kansas City to Grand Forks, N. D., serving six new terminals. Existing pump stations on lines from Oklahoma to Minnesota were modernized.

Courts Asked to Enjoin Oak Ridge Gas Pipe Line

WASHINGTON.—Coal and railroad interests asked the courts last week to halt construction of a pipe line designed to supply the Oak Ridge, Tenn., atomic-energy plant with natural gas.

A petition was filed with the District of Columbia Court of Appeals on behalf of the National Coal Association, United Mine Workers of America, and the Railway Labor Executives Association, charging that the Federal Power Commission, in granting authorization for construction of the pipe line by East Tennessee Natural Gas Co., had based its decision "solely on the representations of the Atomic Energy Commission" and it was, therefore, "contrary to law, capricious, and arbitrary."

The appeal to the courts was made after actions before the FPC were unsuccessful in halting the line, as well as a sharply critical report of a congressional subcommittee holding that the AEC plan to convert the Oak Ridge plant from coal to natural gas was unnecessary and undesirable.

The three organizations told the court that the commission had failed to comply with the provisions of the Administrative Procedure Act which require it to base its findings, conclusions, and order upon the record and evidence. They charged that the FPC had declared flatly in its order that its decision was based "solely" on the representations of the Atomic Energy Commission.

CRC

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PIPE COATING and WRAPPING MACHINES
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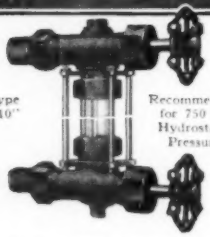

Type "10"

Recommended for 750 lb. Hydrostatic Pressure

Steel construction throughout with stainless steel interior trim. Automatic shut-off is positive and instantaneous; stainless steel balls shut off the flow of liquid when glass breaks. Heavy duty stuffing boxes, union connections, offset construction facilitate cleaning and simplify glass replacement. Conform with A.P.I.—A.S.M.E. requirements.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

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Wyoming Pipe-Line Firm Granted More Time on Line

Wyoming Public Service Commission last week granted Plains Pipe Line Co., Newcastle, Wyo., an additional 30 days to complete its 8-in. line from Fiddler Creek oil field to the existing system at Lance Creek. *(The Oil and Gas Journal, May 19, 1949, page 381).*

The company filed a petition with the commission asking the extension beyond its original August 21 deadline "to procure pipe according to contract."

With new oil wells being brought in in the Fiddler Creek area, reports indicate that a considerable amount of oil is being held in storage awaiting completion of the line.

Plains Pipe Line said that although it was asking the additional time, it hoped to complete the line before the expiration of the extra time.

The line will have a capacity of 13,400 bbl. of crude daily. Estimated cost has been set at $1,500,000.

Hearing by FPC August 22 On Montana-Dakota Plan

A hearing will begin August 22 in Washington, D. C., by Federal Power Commission on the joint application of Montana-Dakota Utilities Co., and Montana-Wyoming Gas Pipe Line Co. for FPC authorization to construct a pipe-line project which would make available an additional 35,000,000 cu. ft. of natural gas per day to customers of Montana-Dakota in Montana and North and South Dakota. Estimated cost of the project is $3,419,880.

The companies' proposal includes plans for a 340-mile, 12¾-in. pipe line extending from the Worland field in Washakie County, Wyoming, to Montana-Dakota's Cabin Creek compressor station in Fallon County, Montana; a combination gas compressor, dehydration, and sulfur-removal plant near the Wyoming origin of the line; and two branch lines, one connecting with the present gas distributing system at Miles City, Mont., and the other connecting with a distributing system to be built by Montana-Dakota in Forsyth, Mont.

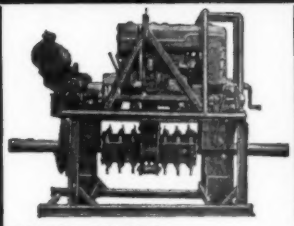
The 340-mile main pipe line and combination plant would be constructed and owned by Montana-Wyoming and operated under lease by Montana-Dakota. The branch lines would be constructed, owned, and operated by Montana-Dakota. Both companies have main offices in Minneapolis.

Previously Wyoming Public Service Commission refused a permit to the companies for construction of the line *(The Oil and Gas Journal, July 21, 1949, page 119)* stating it had no authority to grant such a permit.

CROSE

MODEL M

CLEANING MACHINE



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PIPE CLEANING . . .

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Standard models:

Model M—3" to 14" Pipe Cleaning machine
Model K—16" to 26" Pipe Cleaning machine
Cleaning and priming machines for larger pipe sizes also available.

Available on rental or outright sale basis.

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MANUFACTURING COMPANY, INC.

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M & M BUILDING HOUSTON, TEX.

1369

MILES

During our fiscal year, ending Nov. 30, 1948, five spreads of Latex Construction Company laid and took up a grand total of 1369* miles of pipe. This imposing mileage of pipe line work was divided as follows:

Miles of Pipe laid, 16" and larger 588
Miles of Pipe laid, 8", 10" and 12" . . . 379
Miles of Pipe taken-up and reconditioned . . 402

*This figure does not include the mileage under contract at the end of 1948, to be completed during 1949, amounting to 181 miles.

Latex CONSTRUCTION COMPANY

General Contractors

Oil-Gas-Gasoline-Water Pipelines

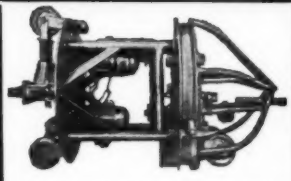
HOUSTON, TEXAS ATLANTA, GA.

L. H. Favrot — G. A. Paterkin — J. W. Sharman — R. P. Gregory

CROSE

ELECTRIC MODEL

INTERNAL LINE-UP CLAMP



The electric model shown above is a rugged, heavy-duty clamp, electrically operated for the tough jobs.

ADVANTAGES:

For The Owners:
Better stringer bead; better finish weld; better pipe line.

For The Builder or Contractor:
Speed; stringer bead cut-out eliminated; economy; swabbing and alignment with one tool; less labor required.

Available for pipe sizes 12" through 36"
Rental or Outright Sale Basis

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THE WORKINGEST MACHINES YOU EVER SAW OR USED...

CLEVELAND Trenchers—fast, rugged, easy to handle on the job and to move from job to job—assure you most trench in most places at least cost on all your oil field projects.

THE CLEVELAND TRENCHER CO.
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INTERNATIONAL TRAC-TRACTORS
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POWER UNITS
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LARGE STOCK PARTS
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Boyd is one of the largest distributors of International industrial machinery west of the Mississippi.
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BOYD
CO.
TULSA, OKLAHOMA

Preliminary Survey Under Way on Canadian Pipe Line

Engineers are reported now engaged in taking a preliminary survey for a $100,000,000 Canadian oil pipe line, planned to stretch from Regina, Sask., to Duluth, Minn. Imperial Oil, Ltd., undertook the survey.

The line would span northern Minnesota and a broad area of South-Central Canada, and tentative plans call for it to enter the United States somewhere south of Winnipeg, Man., and run southeast to Duluth, it was reported.

Imperial's executive assistant, W. F. Prendergast, said in a telegram that the early survey must be followed by detailed engineering and economic studies before specific facts can be determined.

El Paso Natural May Ask For Rehearing on Proposal

Possibility that El Paso Natural Gas Co. might ask for a rehearing on its application to construct a natural-gas pipe line from the San Juan basin to California was expressed last week by Rep. John Miles of New Mexico.

Miles noted the Federal Power Commission's unfavorable decision on the firm's proposal, and said that it came "as a surprise to us here" in Washington.

However, he said he is sure the company "can and will ask for a hearing to present further evidence as to the contractual arrangement for an adequate natural-gas supply.

"This seems to be the only thing lacking for it was upon this that the commission seemed to hinge its unfavorable decision," he said.

Interstate to Resume Montana Line Next Month

Construction of 70 miles of 12-in. crude-oil pipe line by Interstate Oil Pipe Line Co. from Billings, Mont., to fields in southern Montana and northern Wyoming will be resumed in September after the close of the annual irrigation season in that area.

Construction of the 28 miles of line began in March at Billings on the north end moving south and was completed through Laurel to a point about 2 miles south of Silesia. Crews then moved to the southern end of the line near the site of Interstate's new Silver Tip station, in Elk Basin field, and worked north approximately 15 miles to where the line will cross Clark Fork River. Construction of approximately 24 miles in the center section of the line from the Silesia area south to Clark Fork River was suspended in early June during the growing and irrigation season so as not to impede farming operations along the route.

NO OTHER PIPE JOINT PROTECTION LIKE TAPECOAT

It's easy to see why more and more distribution engineers are specifying TAPECOAT .. the modern pipe joint protection in tape form.

It's so quick and easy to apply ... wraps around the welded pipe joint like tape around a baseball bat.

TAPECOAT is clean to handle, too. No dirt, no mess. It saves time, work, material and money while giving protection equivalent to the mill coating on the pipe.

That's why it will pay you to specify TAPECOAT for coating welded field joints, river crossings, pipe through building walls, service connections and on many other applications.

Write for bulletin, samples and prices

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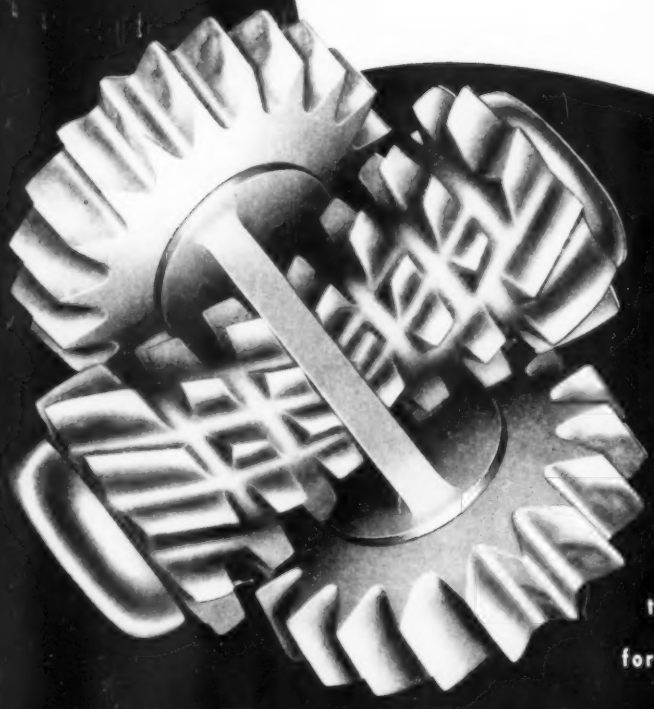
FASTER, STRAIGHTER, FULL GAUGE HOLE



there are 11 types of H. C. Smith Rock Bits—each with specially designed teeth to drill specific formations.

H C Smith OIL TOOL CO.

GENERAL OFFICES AND PLANT P.O. BOX 431, COMPTON, CALIF.

Among the

Drilling Contractors

Downward Trend Broken In Number of Active Rigs

For the second week in succession, an increase is reported in the number of rotary rigs operating in the United States and western Canada, indicating a possible definite reversal of the steady downward trend in drilling activity that has existed for several months. Rigs operating during the week ended August 8 (latest report) totaled 2,029 as compared with 2,000 for the previous week, an increase of 29. During the previous week there was an increase of 3 rigs, which makes the present total 32 above that of the week ended July 25, when the number of active rigs dropped to the lowest level since the week ended January 31. Principal increases in drilling activity reported are in the Gulf Coast and West Texas and New Mexico areas. The number of operating rigs by areas follows:

ROTARY RIGS IN OPERATION*
(United States and Western Canada)

Area	Week ended 8-8-49	Change week ended 8-1-49	Change week ended 8-9-48
Gulf Coast	519	-14	-37
W. Tex.-N. M.	526	-16	-85
Ark.-N. La.-E. Tex.	161	-6	-9
Oklahoma	238	-4	-58
Kansas	109	-5	-38
Illinois-Eastern	132	-2	-18
Rocky Mountains	117	-6	-52
Pacific Coast	152	-3	-51
Total U. S.	1,954	-28	-348
Western Canada	75	-1	-23
Total	2,029	-29	-325

*Courtesy Hughes Tool Co.

New Contracting Company

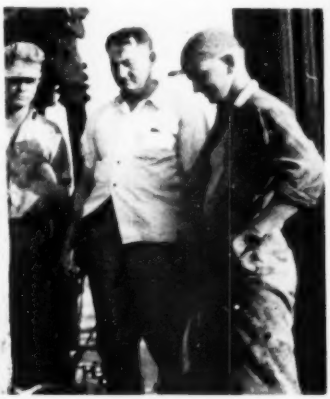
Fred C. and Ferris F. Hamilton, formerly of Columbus, Ohio, have organized the Hamilton Drilling Co. to engage in contract drilling in the North Texas area. Main offices are located at Wichita Falls.

Longhorn Drilling Corp., Three Rivers, Tex., is drilling a 7,500-ft. contract wildcat test, No. 1 Haynes Estate, for American Republics Corp. and H. R. Smith in the Los Mogates and Los Venados grant, Zapata County, Southwest Texas. Approximately 1,500 ft. of $10^{3}/_{4}$-in. surface casing has been run.

Ford Chapman, West Texas drilling contractor, has moved his offices from Odessa to Pecos, where he will be closer to the Chapman field, in which he currently is operating for the Delaware Basin Oil Co.

Fred M. Manning, Inc., Denver, is starting another well for General Petroleum Co. in the Horse Creek field, Laramie County, Wyoming. It is No. 72-7-P, in 7-16n-68w.

Warren & Bradshaw, Tulsa, has been awarded contract for a 9,400-ft. wildcat to be drilled for Coronada Oil Co. on the latter's Foster lease in 26-9n-4w, McClain County, Oklahoma. The location is about 2 miles southwest of the Newcastle pool and the same distance west of the Southeast Newcastle pool.



Day-tour crew for Big 6 Drilling Co., Houston, operating for Bering Co. in the Big Creek field, Fort Bend County, Texas Gulf Coast. Left to right: H. N. Burrell (driller), J. L. Tribble, A. F. Turicchi, Woodrow Greathouse (toolpusher), and E. Schwartz

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WATER GAGE SET

For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

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WITH
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KANT-GALL TOOL JOINT COMPOUNDS

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You can always break the joint when you use Jimmie Gray Compounds! That's because each one is engineered to do certain specified jobs best! You can depend on their thread-protecting film to prevent galling and washouts, too. Satisfaction is assured thru the famous Jimmie Gray money-back guarantee!

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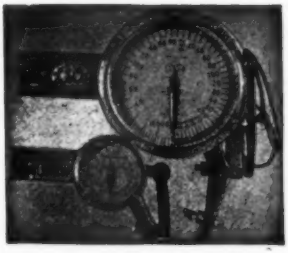
LINE SCALES



(Above) Super 500,000-lb. capacity, 14" dial. (Below) Packer Special, Capacity 40,000 lbs., 6" dial. 18 other models for every drilling, well servicing, or work-over need.

20 MODELS to choose from

With a LINE SCALE you know the pull on the line, and the weight on the bit in pounds. Repeated tests prove the accuracy and dependability of LINE SCALE readings under all working conditions . . . even in areas of rapid temperature changes.

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Gulf Coast Representative: Crenshaw Sales Co., Houston, Texas, Box 2031

Grey Wolf Drilling Co., Houston

WITH one small drilling rig and a spudding machine, Roger J. Wolfe began his career in the contracting business at Electra, Tex., in 1919. In 1931, he purchased another rotary rig. Three years later, William D. Gray of Tulsa joined him in a partnership. Later, capitalizing on their last names, they incorporated the Grey Wolf Drilling Co. with Wolfe as president, and Gray as vice president. Headquarters now are at Houston.

ROGER J. WOLFE

Drilling equipment.—Since its inception, the company has expanded its facilities steadily, and now operates six rigs. These include four steam and two power rigs.

Operations.—Operations are confined to the Gulf Coast area where, currently, one rig is drilling for The Texas Co. in the Rio Grande Valley; one for Pan American Production Co. in the South Gillock field, Galveston County; one for Fidelity Oil & Royalty Co., and one for its own account in Brazoria County; and the other for Ohio Oil Co.

Personnel.—In addition to Wolfe and Gray, officers are: Stanley E. Jay and L. B. Windham, Jr., vice presidents; and Kenneth J. Jack, secretary and treasurer. J. B. Maudlin is drilling superintendent, and Virgil E. Williams, assistant superintendent.

Halko Drilling Co., Shawnee, Okla., has the contract for a 4,800-ft. wildcat test to be drilled for Sterling Oil Co. on a state school land lease in 16-11n-6e, Pottawatomie County, Oklahoma. Objective is the Wilcox sand. Location is 1½ miles south of another wildcat in which Sterling Oil Co. is testing favorable showings in the Hunton lime.

Gillespie & Sons, Tulsa, are starting a 6,400-ft. test for A. G. Oliphant on the latter's Hoover lease in 2-24n-5w, 7½ miles south and a little west of the Rich Valley pool, Grant County, Oklahoma.

Provost & Easterbrook have the contract for R. E. Havenstrite 3 Ryles, first confirmation test in the new Oak Creek field, Routt County, Colorado. Location is in 2-3n-86w, 900 ft. northeast of the discovery well.

Loffland Brothers Co., Tulsa, has started a 10,000-ft. test, 73-31 Unit, for Tide Water Associated Oil Co. in the Poison Spider area, Natrona County, Wyoming. Location is in 31-32n-83w.

White & Webb Drilling Co., Dallas, has started a 6,500-ft. wildcat test for E. L. Pinkston near Stamps in Lafayette County, Arkansas. Location is on the Knighton farm in 15-15-23.

Southern Six Drilling Co., Opelousas, La., is the contractor for Callery & Hurt on a 9,000-ft. test started in the Bayou Mallet field, Acadia Parish, Louisiana Gulf Coast. The location is 1 Clement Richard in 13-7s-1e.

Galloway & Smith have contracted with Milo Siegel of Newcastle, Wyo., to drill 1 Patented, a 4,500-ft. wildcat test in 3-11s-52w, 15 miles east of Hugo in Lincoln County, Colorado.

Get Oil to the tank in Pipe line condition by using Dragon Cups

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GET THEM AT YOUR SUPPLY STORE

DRAGON MFG. CO.
Marietta, Ohio

Standco
NO-SMOKE

STANDCO BRAKE LINING

Nothing novel—no bunk, but it gets the job done without scoring brake rims. See pages 3608-3613, Composite Catalog.

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HERCULES LUBRICATING UPPER GLAND

Protects polished rod and liner against excessive wear

Designed with a minimum of parts for easy installation and economical operation. This new lubricating gland lengthens the life of the rod or liner as well as the packing in the stuffing box. On various tests, the life of the polished rod or liner and the packing in the stuffing box was increased many fold. Equipped with zerk fitting to insert bearing grease and with a regular Hercules cone packing ring, serving as a wiper ring. Fits all type Hercules stuffing boxes now in use.

Write for Bulletin No. 124-SBLG

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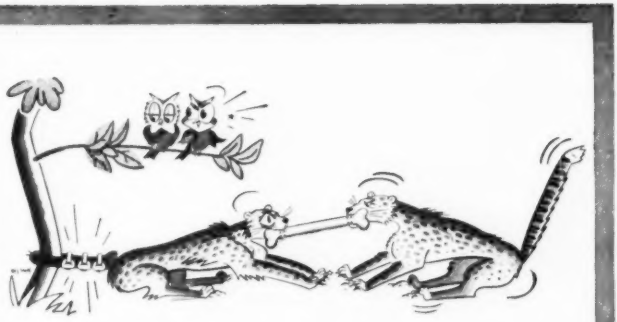

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Fasten wire rope with CROSBY CLIPS. Safe, simple, speedy . . . applied anywhere by one man with one wrench. *Drop-forged*, not cast. Hot dip galvanized. All sizes . . . for ¼" to 3" wire rope. Distributors everywhere; made only by AMERICAN HOIST AND DERRICK CO., St. Paul 1, Minnesota.

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9904

Here's the *Proof* of Preference for WISCONSIN HEAVY-DUTY *Air-Cooled* ENGINES

✓ 4 Out of 10 Carburetor Type Engines made in 1947 in 2 to 30 H.P. Range were WISCONSINS!

According to an official bulletin issued on April, 22, 1949 by The Bureau of Census, Dept. of Commerce (Preliminary Industry Report, Series MC-31D, covering the production of Internal Combustion Engines for the year 1947) 40.2% of all carburetor type engines within a cu. in. displacement range from 11.0 to 175.9 were Wisconsin Air-Cooled Engines.

The summary includes data received by the Census Bureau from 134 engine manufacturers. The tabulation of the 9 groups within the above displacement range, representing 528,063 units, allocates 212,174 units to Wisconsin, or an average of 40.2% of the total production.

These figures speak for themselves . . . in terms of outstanding preference for Wisconsin Air-Cooled Engines among power users in all fields.

WISCONSIN MOTOR Corporation
MILWAUKEE 1'4, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

WRITE TO HARLEY SALES CO.
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Oil field distributors for Wisconsin Engines and all types of utility units.

Low Cost Model W Skid Winch

- A light weight unit that will do big jobs economically.
- It's ideal for water well drilling draw-works.
- Has new convenient foot operated controls.
- Can be mounted on small truck.
- Low operating cost.

You won't believe what this small unit will do, but here's what operators say—

★"Strings of 2½" upset tubing 3180' long held easily with one hand on brake lever"

★"Example of the pulling speed of this unit is a recent job where 3600' of 2½" upset tubing was pulled in singles and laid down in two hours and 25 minutes".

★"Time after time, I have checked fuel consumption for round trips of rods and tubing in singles laid down for depths of 3100'-3200', and find that four gallons or less is consumed during such jobs".

★"Considering the moderate initial cost, wide capacity range, ease of transportation and economical operating overhead, this unit is definitely my first choice for contract work".

★ *Names and addresses available on request.*

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DRAW WORKS
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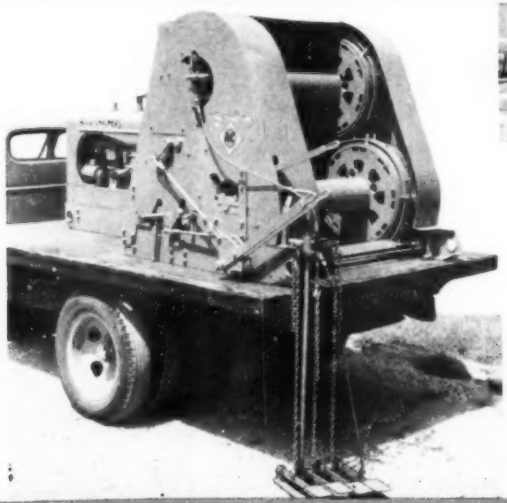

Top—Single Drum Model W Skid Winch, seat controls and foot operated clutches.
Above—Single Drum Model W. Skid equipped with twin pole mast.
Bottom—Double Drum Model W Skid Winch, ground operated foot controls.

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NATURAL GAS

Ohio Fuel Seeking Big Gas-Rate Increase

IN what it termed "one of the largest rate increases ever proposed to the Federal Power Commission," FPC reported last week that Ohio Fuel Gas Co., Columbus, member of Columbia Gas System, has applied for a change in tariff covering its rate for wholesale service. The increase, if granted, would amount to approximately $1,228,568 annually, based on anticipated sales for the 12-month period ending February 28, 1950.

Ohio Fuel, FPC reported, told the commission that the proposed increase, which would amount to about 4.2 cents per 1,000 cu. ft. of gas, is necessary because unprecedented demands have required changes in sources of gas supply, necessitating large purchases of natural gas from the Southwest. This change in operations, the company claims, has required heavy investments in production and transmission facilities of some $25,000,000, and the cost of gas purchased has increased approximately 3 cents per 1,000 cu. ft. The company also said that it has experienced substantial increases in labor and material costs.

The firm's wholesale purchasers of gas include a number of big companies within the state which serve customers in a wide area in Ohio. Largest purchasers are Cincinnati Gas & Electric Co., which would pay an estimated increase of $283,199; Dayton Power & Light Co., paying an increase of $682,712 under the new rates; and West Ohio Gas Co., which would pay $122,916 additional.

The company told FPC it wanted the new rates to become effective September 6. Proposal is now under study by FPC's staff.

Expansion of Midwest Pipe Lines Given FPC Approval

Federal Power Commission has authorized Michigan-Wisconsin Pipeline Co. and Michigan Consolidated Gas Co., both of Detroit, to expand their natural-gas systems serving Missouri, Iowa, Wisconsin, and Michigan communities.

One of the projects would increase capacity of Michigan - Wisconsin's Texas-to-Michigan line now under construction by 27,000,000 cu. ft. daily, to a total of 155,000,000 cu. ft.

Michigan - Wisconsin facilities authorized include substitution of 24-in. pipe for the 26-in. pipe previously authorized between Hugoton field in Texas and the Wisconsin Junction near Millbrook, Ill., and installation of compressor units to increase compressor horsepower from 15,000 to 21,600.

Michigan Consolidated was authorized to build additional facilities in the storage fields and pipe lines for distribution of gas in its market area. It will receive from Michigan-Wisconsin the natural gas it needs in excess of that supplied under its contract with Panhandle Eastern Pipeline Co.

To finance the project, Michigan-Wisconsin, under authorization of Securities and Exchange Commission, has sold $22,000,000 in common stock to its parent, American Light & Traction Co. (now American Natural Gas Co.) and has entered into agreements with Metropolitan Life Insurance Co. and Mutual Life Insurance Co. of New York for sale of $66,000,000 in bonds.

FPC Dismisses Application For Texas-Illinois Line

Federal Power Commission has dismissed application for a $119,000,000 project for a 1,184-mile natural-gas pipe line from Texas to Illinois.

Gulf Coast Northern Gas Co., Tulsa, applied for authority to construct the line last August, and proposed to supply Natural Gas Pipeline Co. of America, Chicago, with 245,000,000 cu. ft. of natural gas a day initially, and 350,000,000 cu. ft. a day ultimately for resale in the Chicago area.

FPC said Gulf Coast Northern reported in May it did not intend to continue with the project as filed, but was negotiating for the sale of gas to other companies.

The commission said that the company had announced it would amend the application but had submitted no further information. It has not indicated when it will submit the new application, FPC stated, and due to this reason, the former application was dismissed.

Texas Aluminum Plant to Use Natural Gas for Fuel

HOUSTON.—The country's first aluminum plant which uses natural gas for power generation will begin operating at Port Lavaca, Tex., in November, as first units of the $30,000,000 Aluminum Co. of America plant are completed.

The installation is expected to produce about 114,000,000 lb. of aluminum per year and will employ approximately 600 men. Port Lavaca is on the Texas coast about 100 miles southwest of here.

Home Gas Co.'s Proposed Rate Increase Is Approved

Federal Power Commission has accepted for filing Home Gas Co.'s proposed gas tariff which will increase the company's rates for natural gas sold to six distributing companies operating in New York State by approximately $217,000, or 9 per cent annually. Increase becomes effective August 1.

Home Gas is an operating company of Columbia Gas System and is headquartered in Pittsburgh. It operates a pipe-line system in New York.

Natural Gasoline

Construction Under Way On Texas Gasoline Plant

HOUSTON.—O. L. Olsen has construction under way on a new 25,000,000 cu. ft. daily gasoline plant being built in the Chesterville area of Colorado County, 60 miles west of Houston, by Del Rey Petroleum Co. and associates, Houston.

The high-pressure absorption plant will serve three gas and gas-condensate fields in the area, Orange Hill, Austin County; Lissie, Wharton County; and Chesterville, Colorado County. Residue gas will be sold to Tennessee Gas Transmission Co., of Houston. The new plant is expected to be in operation by November 15.

Del Rey is dismantling its present 12,000-gal. per day gasoline plant in Hardin field of Liberty County. The field gathering system and part of the plant equipment is being sold to Atlantic Refining Co. Atlantic will use these facilities for gas-lift operations. The remainder of the equipment will be utilized in the construction of the new Del Rey unit at Chesterville.

Six Producers Planning Natural-Gasoline Plant

Six producers have begun preliminary work on a $6,000,000 natural-gasoline plant in the southern part of Andrews County, Texas, which will handle flare gas.

Facilities, which will take 22,000,000 cu. ft. of natural gas daily, will be jointly owned by Pure Oil Co., Humble Oil & Refining Co., Magnolia Petroleum Co., Union Oil Co., Lion Oil Co., and Pacific Western Oil Co.

Pure will operate the plant and it is expected to be completed by July 1950.

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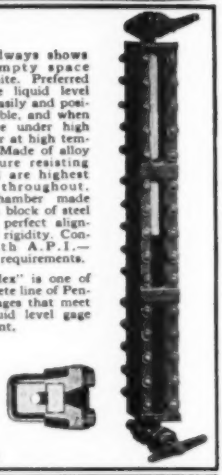
LIQUID LEVEL GAGES

Liquid always shows black—empty space shows white. Preferred where the liquid level must be easily and positively visible, and when liquids are under high pressure or at high temperature. Made of alloy temperature resisting steel and are highest quality throughout. Liquid chamber made from solid block of steel to assure perfect alignment and rigidity. Conform with A.P.I.—A.S.M.E. requirements.

The "Reflex" is one of the complete line of Penberthy Gages that meet every liquid level gage requirement.



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REFINING

39-Day Strike at Pennzoil Refinery in Oil City Ends

A 39-day strike of workers at the Pennzoil Co.'s refinery at Rouseville, Pa., ended last week with a compromise in which strike leaders accepted an 8-cent hourly wage increase, plus other concessions. Workers are members of the C.I.O. Oil Workers International, Local 455.

Pennzoil and union executive strike-committee members announced the compromise jointly. The 25-man strike committee represented the 366-man membership in all negotiations since the walkout began at midnight June 30.

Two plants of the company had been shut down since the walkout began. The union had insisted on a 10-cent hourly wage increase, and the company, in granting the 8-cent increase, also granted 3 weeks vacation to men of 20 years of service.

The Rouseville plant has a crude-charging capacity of 8,500 bbl. daily.

Phillips Plant Near Borger To Resume Operation Soon

Operation of the Phillips Petroleum Co. plant at Phillips, near Borger, in Northwest Texas, for production of diisopropyl alkylate, an antiknock blending ingredient, will be resumed late this month, according to an announcement by the company.

The antiknock agent is used as a blending stock and gives knock-free performance to high-quality aviation fuels and improves octane rating of motor fuels. The plant, constructed during World War II for making high-quality aviation gasoline, is the only plant of its kind for commercial manufacturing of the product.

The unit has been extensively modernized since operations were halted shortly after the war. It will be operated in conjunction with the company's other manufacturing facilities in the Texas Panhandle area.

Cotton Valley Plant Sold; Now Offered for Resale

Dulien Steel Products, Inc., Seattle, Wash., has purchased from the Government for liquidation the Cotton Valley, La., refinery designated as Plancor 592. The 1947 appraisal was set at nearly $7,500,000, and reuse value was estimated at approximately $2,000,000 for the facilities, which were installed for the special purpose of producing alkylate, a component of 100-octane aviation gasoline used by the armed forces in World War II.

The plant is now offered for resale, Louis Dulien, president of the steel-products company, announced. A liquidation office has been established at the plant, 45 miles from Shreveport.

In 1946 Plancor 592 facilities were taken over by Office of Rubber Reserve and at a cost of $430,000 were converted for the production of butylene concentrate. Dulien said the plant would be sold as a whole unit or by the piece.

Mississippi Chemical Lets Contract for Ammonia Plant

HOUSTON.—Girdler Corp. of Louisville, Ky., has been awarded a $5,000,000 contract to build an ammonia plant at Yazoo City, Miss., for Mississippi Chemical Corp.

The firm already has engineering work under way on the proposed plant. It is anticipated that the construction work will begin during the fall.

C. S. Whittington was elected president of Mississippi Chemical Corp. last week to succeed the late John Sharp Williams. P. C. Williams, banker, has been named to fill the vacancy on the board of directors caused by the death.

New Ammonia Plant to Be Built by Dow at Freeport

HOUSTON.—A $5,000,000 ammonia plant, with a capacity of 100 tons per day, will be built by Dow Chemical Co. at Freeport, Tex.

Construction work on the new chemical plant is scheduled to begin about January 1, and it is anticipated that the plant will be in operation late next year. Raw materials will be hydrogen available from the company's huge chlorine plant in Freeport, and nitrogen from the air. These will be combined by the Haber-Bosch process to produce the end product.

Shell Opens New Wax Plant At Refinery Near Houston

Shell Oil Co., Inc., has opened a new, highly instrumented plant designed to manufacture 75,000,000 lb.

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of paraffin and microcrystalline waxes a year at its refinery near Houston. F. S. Clulow, vice president in charge of manufacturing, said the elaborate instrumentation, consisting mainly of electronic-control equipment, was installed in order to provide efficient process control, and to insure product quality.

Charging stock for the new plant is crude wax from lubricating oils produced in the adjacent lube-oil plant. Processing of the charging stock into finished waxes involves solvent refining and purification.

Gulf Coast's Independent Refiners Are Reorganized

HOUSTON.—Independent refiners of the Gulf Coast have reorganized the Gulf Coast Refiners Association to fight for a "price structure and governmental policies that will let us live," it has been announced.

D. W. Hovey, president Danaho Refining Co., was elected president of the organization whose membership represents refinery capacity of approximately 200,000 bbl. per day. Headquarters will be in The City National Bank, Houston.

The organization functioned for a number of years prior to 1946, when it was dissolved. Application for a new charter as a nonprofit corporation has been filed with the secretary of state at Austin.

Other officers elected at the organization meeting are Harry Leyendecker of Houston, vice president Eastern States Petroleum Co., and Edwin Singer, president, Pontiac Refining Co., Corpus Christi, vice presidents; and John Hamman, Jr., president of Hamman Oil & Refining Co., treasurer. In addition to the officers, members of the board of directors include S. S. Seltzer, Jr., Southwestern Oil Refining Co., Corpus Christi; Freeman Burford, Dallas, vice president of the Sid Richardson Refining Co., which operates a refinery at Texas City, and V. E. Smith, vice president of the Petrol Refining Co. of Texas City. Other directors will be added later, Hovey announced.

Officials of eight Gulf Coast independent refineries were present at the organization meeting.

Developments of the past year which have caused partial or complete shutdowns of many independent refineries have created a serious situation, Hovey said in a statement explaining reasons for revival of "this once active and aggressive organization."

During the war years, when the petroleum industry worked as a unit, under the Petroleum Administration for War, it was recognized that crude prices had to be "commensurate with refinery prices for products," Hovey said. Until the first of this year, he explained, crude and product price changes were in direct proportion.

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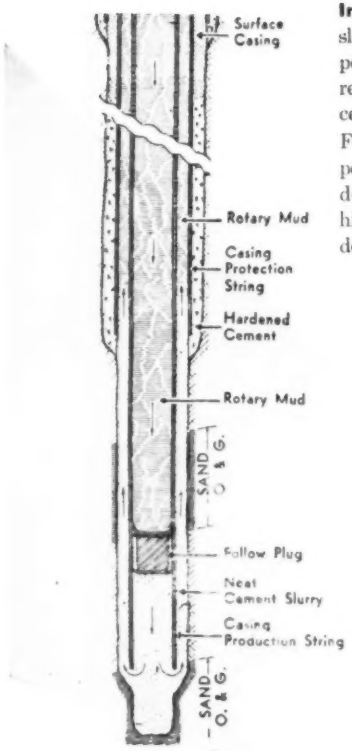

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Exploration and Drilling

Eastern Wyoming Test Looks Promising

ON the southeast rim of Powder River basin, in Niobrara County, Wyoming, Atlantic Refining Co. 1 State (Lightning Creek) NE NW NW 36-35n-66w, looks like it might make a high-gravity oil discovery in the Basal Sundance (Jurassic) sand. The location is only a few miles south of the west end of Lance Creek field.

A drill-stem test at 3,860-81 ft., open 55 minutes, had gas to the surface in 16 minutes, and recovered 100 ft. of mud plus 700 ft. of oil. The oil tested 41.7 gravity, is reported to be light green color and sweet. A core was then taken at 3,881-97 ft., and recovered 12 ft. of fully saturated oil sand with good porosity.

Atlantic has a spread reported to cover about 35,000 acres. The location was made, according to reports, on a basis of part surface work plus interpretation of seismograph shooting. It is generally believed that the structural picture worked out showed extensive faulting.

There will of course be further testing until a pretty good idea is obtained about the thickness of the pay section, and approximate location of the water line. It is not known at this time whether the well will be carried on down to test the sands in the Minnelusa (Pennsylvanian). However, with Lance Creek field so close, and the main production in that field coming from Minnelusa sands, such a course would be likely. This is all the more true, since the Sundance also produced oil at Lance Creek.

With so much "black oil" (low gravity, high sulfur content) shut in, the high-gravity crude is welcome. Of course there is nothing surprising about getting sweet crude in the Sundance; it is the normal thing. It is the pre-Jurassic pays in Wyoming that yield so much black oil.

However, that brings up a point that is probably being considered in the question of deeper testing. Nearby Lance Creek field is one of the few important exceptions to the rule of finding only black oil in the pre-Jurassic pays. There the big Minnelusa pays have yielded high-gravity, sweet crude. There are many geologists familiar with the area who explain the Lance Creek contradiction this way. They claim that faulting has thrown Cretaceous source beds into contact with Pennsylvanian reservoir beds. Therefore although the light oil comes from the Pennsylvanian pays, it is really Cretaceous in origin.

This theory of Cretaceous (or possibly Jurassic) origin is strengthened by Crawford's and Larsen's work with correlation index numbers. (See The Occurences and Types of Crude Oils in Rocky Mountain Region, A.A. P.G. Bulletin October 1943). The correlation index number system is based on physical characteristics of the crude, mainly boiling points. Thus it has nothing to do with geology. Crawford and Larsen point out that the Minnelusa oil at Lance Creek is the only "Type II" pre-Jurassic oil in the state, and also conclude that the source may be Cretaceous or Jurassic source beds, faulted against Minnelusa reservoir beds.

The fact that the potential discovery is on a rim structure on Powder River Basin will arouse hopes again for many oil men. Salt Creek, a 400-million-barrel field, and the biggest ever found in the Rocky Mountains, had its first oil in 1906. It is on the rim of Powder River basin. Ever since then, oil men have been looking and looking for more oil around the basin, with surprisingly poor luck. True, Lance Creek will probably go a little over the 100-million-barrel mark, but the other finds have generally been much smaller.

Even if the major fields are rare, it has always seemed that where a Salt Creek had been found, the hunting ought to have been better than it has turned out. Maybe this new strike will turn out to be an exception to the general rule.

Charles J. Deegan.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

SOUTHWEST TEXAS.—A new producer has been discovered with the completion of Humble Oil & Refining Co. 3 Mrs. S. K. East, in the Rita area, Kenedy County. On initial test the well flowed 43 bbl. of 47°-gravity oil per day with 250-psi. pressure on the tubing. Total depth of the well is 9,708 ft., and production is through perforations at 5,122-32 ft.

ROCKY MOUNTAIN AREA.—Three apparent discoveries were made in Wyoming this week, with successful tests on Atlantic Refining Co.'s Lightning Creek wildcat in the basal Sundance, Husky Refining Co. and Continental Oil Co.'s Salt Wells test, and Sinclair Oil & Gas Co.'s Happy Springs unit. Phillips Petroleum Co. is also reported testing its interesting wildcat west of Yellowstone National Park, Gallatin County, Montana, in an area where there has been no previous drilling.

CANADA.—Canadian Gulf Oil Co.'s Walter Marr 1 confirms a major wet gas field in the Pincher Creek area. The Marr 1 is not only Canada's deepest producing well (12,473 ft.) but also the largest wet gas well ever completed in the Dominion, with a calculated potential of 83,000,000 cu. ft. of gas and 3,000 bbl. of 52½ -gravity oil per day. Total depth is 12,768 ft.

MID-CONTINENT.—Oklahoma's Elk City field, Beckham County, now stretches 8 miles in a northwest-southeast direction, with successful tests at Shell Oil Co. 1-B State, 8-10n-21w, a western extension. In Stafford County, Kansas, Hartman et al, 1 Jordan swabbed 22 bbl. of oil per hour on initial test to open a new Lansing pool.

SOUTH LOUISIANA

Pointe a la Hache Field Gets New Pay Discovery

NEW ORLEANS—A new pay sand has been discovered at Pointe a la Hache by Sid W. Richardson 10-E Humble-De'acroix State 1212, 34-16s-14e, Plaquemines Parish. The fell flowed 93 bbl. of 34.6°-gravity oil per day through a 9/64-in. choke, with 500 psi. pressure on the tubing. Total depth of the well is 11,180 ft., and production is through perforations at 8,838-42 ft.

Barnsdall Oil Co. is drilling below 3,015 ft. in its third offshore test in the Breton Sound area where it has drilled one dry hole and discovered a gas-producing dome. The test is the 5 Breton State 1227. Barnsdall als is building structures for two other tests in the same general area.

Atlantic Refining Co. is continuing to test the 1 Albert Meche, wildcat in 9-7s-3e, St. Landry Parish. The well tested a slight amount of oil through perforations at 9,502-06 ft. These perforations were squeezed off, and string was reperforated at 9,474-82 ft. Operators are tesing these perforations for completion of the well.

Hawkins and Jayred are still testing the 1 Edmond Young, a potential gas-condensate discovery, in 31-7s-2w, Acadia Parish. The well previously tested distillate through perforations at 9,129-41 ft., and is bottomed at 9,165 ft.

On the Weeks Island dome, Iberia Parish, Shell Oil Co. is running electric log in the 1 Gall-State. Hole is bottomed at 15,372 ft. in shale and lime. Projected depth of the well is 15,500 ft.

The 21 new locations in South Louisiana include three wildcat starts, one each in Acadia, Beauregard, and Calcasieu parishes. There was one successful exploratory well completed in Plaquemines Parish and one dry in Jefferson Parish.

SOUTH LOUISIANA SUCCESSFUL WILLDCAT

Plaquemines Parish: New pay at Pointe a la Hache—Sid W. Richardson 10-E Humble-Delacroix State 1212, 34-16s-14e, top sand 8,838 ft., TD 11,185 ft., perf. 8,838-42 ft., IP: 93 bbl. oil per day, 9/64-in. choke, GOR 700, TP 500, 34.6° grav.

SOUTH LOUISIANA WILDCAT FAILURE

Jefferson Parish: S. W. Richardson 1 C. R. & H. A. Housiere, 26-7s-7w, approximately 1½ mi. W of Indian Village production, dry, TD 8,807 ft.

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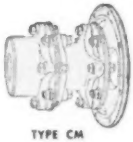

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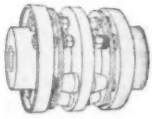

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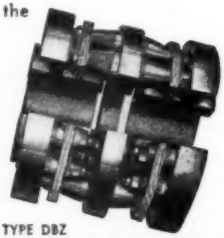

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CALIFORNIA

Idle Oregon Test Well Will Be Drilled Deeper

LOS ANGELES—United Oil Co. of Oregon is moving in heavier equipment in its test well in Harney County, Oregon. The well has been standing idle at 5,100 ft. for several months. The new rig will permit exploration to 10,000 ft. Big Basin Drilling Co. is putting the well down. Location is in the Harney basin, SW ¼ of Section 9-23s-31e, near the town of Burns.

In Washington, Ocean City area, Union Oil Co. of California is drilling ahead with 3 State at 8,012 ft. Section 15-18n-12w.

In California, Santa Rosa Island was the location of one more dry test. J. R. Pemberton abandoned 2 Tecolote, 12-2s-32w, at a total depth of 2,284 ft. Eocene formations were topped at 2,275 ft. In spite of what is considered favorable geologic formations none of the tests made so far have achieved production on the island.

Union Oil has stopped work on 7 Wreden in the Carrizo plains. This well was considered the best bet for production after the failure of Independent Exploration Co. 53-36 Producers to make a show on test; 53-36 Producers is now suspended at 2,950 ft. Total depth of 7 Wreden is 3,700 ft.

In the same area Union Oil's 4, 5, and 6 Wreden are still drilling ahead with no shows of production. The 67-36 Temblor-Rexroth of Independent Exploration Co. group, 1,600 ft. northeast of the abandoned 7 Wreden is drilling beyond 4,700 ft. in sandstone.

Orange County is seeing more than usual wildcat activity. There are now six tests under way. Three of the wells are in rigging or spudding stage. These are Jergins Oil Co. 1 Ellis in the Talbert area, 32-5s-10w; Thomas M. Blake's Costa Mesa test; and Erie Oil Co. 2-6 Geisler. The Erie Oil Co. well is not strictly a test, being within the West Newport field area.

Barnsdall Oil Co. 1 Emery Trust may turn out to be the deepest test made in Orange County. The well now stands at 10,669 ft. This is an attempt to locate production south of West Coyote field. The well is located at 25-3s-11w, and is just east of a well abandoned by American Petroleum Co. at 5,190 ft.

The Texas Co. has set location for four tests. In the Devils Den area of Kern County, Section 19-25s-19e, 3-1 Capital Co. will be drilled. Two tests are scheduled for Monterey County. These are 1 Reynolds in the Peachtree Bow area, 6-21s-12e, and 1 Pieri, West Castroville area, Section 19-13s-2e. The fourth well is located northeast of Jacalitos field production in 30-21s-16e. This is 1 Raath.

Dry wells in the Russell Ranch area of Cuyama Valley and west of Russell Ranch production tend to show the White Rock fault at Dibblee depth as the limit of Russell Ranch field. The latest well to be abandoned in this area is Richfield Oil Corp. 87-22 Russell A. The well was dry at total depth of 5,026 ft. Location is Section 22-10n-27w.

CALIFORNIA WILDCAT FAILURES

Fresno County, Dos Palos area: McClana-

han Oil Co. 1 Ora Loma Farms, 7-12s-12e, dry, TD 4,600 ft., elev. 172 ft.

Kern County, Tejon area: Ewan Oil Co. 5 Ewan, 2-11n-18w, dry, top granite 500 ft., TD 502 ft., elev. unknown.

Los Angeles County, Placerita area: Rothschild Oil Co. 1 Perkins, 11-3n-16w, dry, TD 4,963 ft., elev. 1,550 ft.

Orange County, Placentia area: Independent Exploration Co. 30-1 S. Placentia Comm., 7-4s-9w, dry, light blow 18 minutes, recovered 305 ft. mud cut with scum of oil, TD 4,805 ft., elev. 229 ft.

Santa Barbara County, Santa Rosa Island area: J. R. Pemberton 2 Tecolote, 12-2s-32w, dry, top Eocene approx. 2,275 ft., TD 2,284 ft., elev. 272 ft.

South Cuyama area: Richfield Oil Corp. 87-22 Russell-A, dry, TD 5,026 ft., elev. 2,549 ft.

SOUTHWEST TEXAS

New Producer in Rita Area of Kenedy County

CORPUS CHRISTI—Humble Oil & Refining Co. has opened a new producer in the Rita area, Kenedy County, with completion of the 3 Mrs. S. K. East. On initial test, the well flowed 43 bbl. of oil per day with tubing pressure of 250 psi. Total depth of the well is 9,708 ft., and it is producing through perforations at 5,122-32 ft.

J. M. Turkel 2 J. B. Burnes promises to open a new oil field in Guadalupe County. On drill-stem test at total depth, 2,275 ft., the well recovered 1,260 ft. of 38°-gravity oil in 11 minutes. The test was estimated to flow 90 bbl. of oil per hour. Casing has now been run for completion attempt. The well is located in the Samuel Highsmith Survey, 4 miles west of Luling.

A new pay sand has been discovered in West Corpus field, Nueces County, with the completion of The Chicago Corp 2 J. C. Wilson, which flowed 99 bbl. of 42°-gravity oil per day through 7/64-in. choke with 1,000 psi. tubing pressure. Hole is bottomed at 9,309 ft., and is producing through perforations at 8,348-58 ft.

Operators are preparing to test the Jessie I. White 1 Martin McDonald, prospective discovery in the M. Baker Survey, 8 miles southwest of Bastrop, Bastrop County. At total depth of 1,904 ft., the well started flowing gas, mud, and some oil through drill pipe, but was killed by circulating heavy mud. After the well was killed there were several barrels of oil on the pit. No accurate estimate as to potential production is available, but it is believed the well will produce several hundred barrels of oil per day.

Bridwell Oil Co., Chapman Oil Co., and H. L. Wadsworth, of Wichita Falls, have staked the 1 Canales Bros, a new wildcat 15 miles northwest of San Diego, Duval County. Contracted depth of the well is 5,500 ft. This is the area of the new Diego field, recently brought in by Humble.

The 32 new locations in Southwest Texas include 8 wildcat starts, 1 each in Duval, Nueces, Starr, Zapata, Milam, and Williamson counties, and 2 in Webb County. There were two successful exploratory tests completed during the week, one each in Nueces and Starr counties, while five were dry, one each in Frio, LaSalle, Duval, Jim Hogg, and Zapata counties.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) SUCCESSFUL WILDCATS

Nueces County: New pay, West Corpus field—The Chicago Corp. 2 J. C. Wilson, Lot 1, Sec. 6, Range 7, top of sand 8,343 ft., perf. 8,348-58 ft., TD 9,309 ft., Ip: 99 bbl. oil per day, 7/16-in. choke, GOR 1,002, TP 1,000 psi., casing sealed.

Starr County: Discovery—Continental Oil Co. B-120 T. B. Slick Est., A. C. Truitt Sur. 266, A-968, top sand 6,220 ft., TD 8,514 ft., perf. 6,224-35 ft., IP: 104 bbl. oil per day, 12/64-in. choke, GOR 15,920, TP 1,700 psi., 42.3° grav.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES

Duval County: Taylor Refining Co. 1 B. Caballero, Paul Henry Sur. 282, 4 mi. NW of San Diego, dry, TD 5,541 ft.

Frio County: Magnolia Petroleum Co. A-1 Oppenheimer Est., Eugene Phillips Sur. 199, 3 mi. SW of Schattel, dry, TD 4,504 ft.

Jim Hogg County: Don H. Marsh et al 1 E. L. Armstrong Est., Sur. 90, A-333, 1½ mi. NW of San Pablo field, dry, TD 3,253 ft.

LaSalle County: Newman Bros. Drilling and Alaska Steamship Corp. F-3 South Texas Syndicate, Inc., H&GN Sur. 77, ½ mi. SW of Quinnsache field, dry, TD 3,905 ft.

Zapata County: Dulaney Oil Co. 5 Alice Doran Haynes, Block 23, Villa Grant, 16 mi. S of Escobas, dry, TD 1,018 ft.

MISSISSIPPI

Florida's Sunniland Field Gets Another Producer

JACKSON.—Humble Oil & Refining Co. B-3 Lee Tidewater Cypress Co., in 13-48s-29e, Collier County, Florida, is a new producer in the Sunniland field pay. On drill-stem test in open hole at 11,557-79 ft., the well flowed 625 bbl. of oil per day through ¼-in. choke, and developed 400 psi. tubing pressure. Operators are still testing.

Red Wing Drilling Co. has taken over Phillips Petroleum Co. 1 Sylvester, in 48-8n-2w, Pine Ridge field, Adams County, Mississippi, and is attempting to make a producer of the well. Red Wing has set 5½-

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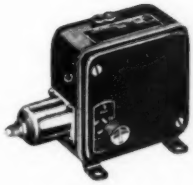

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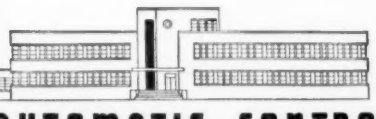

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in. casing at 5,634 ft. Casing was perforated at 5,591-5,600 ft. and the well had slight show of oil. Operator will continue to test at this interval.

Stanolind Oil & Gas Co. 1 J. B. Dockery, wildcat in the new Russum field, Claiborne and Jefferson counties, Mississippi, flowed approximately 248 bbl. of oil per day through 24/64-in. choke. Well was closed down while additional storage was erected, and when reopened, it flowed 13 bbl. of oil in 1 hour through 16/64-in. choke, but pressures dropped rapidly and well died 1 hour and 15 minutes after being opened. This is a repetition of previous tests made on the well, in that the well flows through a large choke, but dies when choke is reduced.

Kemp Drilling Co. and Harry W. Elliott are preparing to spud the 1 Helen Gousett, wildcat, 25-6n-3w, Adams County, Mississippi. The acreage on which the well is being drilled is a farmout obtained from Lion Oil Co. and Skelly Oil Co.

The six new locations in Mississippi include two wildcats, one each in Adams and Smith counties. There were two dry exploratory wells completed, one each in Adams and Harrison counties. Alabama had two new field locations, both in Gilbertown field.

MISSISSIPPI WILDCAT FAILURES

Adams County: Kemp Drilling Co. 1 Harry Foster, 55-8n-1w, dry, TD 6,006 ft.

Harrison County: Hassie Hunt Trust 2 Southern Minerals Corp., 20-5s-13w, dry, TD 7,891 ft.

N. CENTRAL TEXAS

Clay County Wildcat Finds Caddo Production

WICHITA FALLS.—Jack Grace Production Co. 1 W. C. Fields, Block 19, Grayson CSL Survey A-156, wildcat 3 miles north and a little west of Blue Grove in Clay County, has been completed to flow 168 bbl. of 41°-gravity oil daily through a 12/64-in. choke. Production is through perforations from 4,921-46 ft. in the Caddo lime. Gas-oil ratio measured 490:1. The operator will drill the 2 fields 933 ft. northwest of the discovery well. Proposed depth is 6,000 ft. to be drilled with rotary. Grace 1 H. W. Scaling, J. Cott Survey, southern Clay wildcat 7½ miles northwest of Shannon, was drilling below 3,540 ft. in shale.

Skelly Oil Co. 1 E. A. Ater, Section 67, Block 23, T&P Survey, Ellenburger discovery in the northwest part of Nolan County, 5 miles south of Roscoe, on official test pumped 134 bbl. of oil and 2 bbl. of basic sediment and water in 24 hours. Production was from 126 perforations from 7,097-7,120 ft. and tested 44° gravity. The discovery had been drilled to 7,155 ft. and plugged back to 7,120 ft.

Warren Oil Corp. 1 Gresham-Davis, wildcat in the John Little Survey A-2272, 6 miles northwest of Jacksboro, Jack County, on a 2-hour drill-stem test recovered 1 bbl. of salty oil-cut mud. Operators were taking another drill-stem test in sand showing oil from 3,175-85 ft. Henry Grace Production Co. 1 Shallow D. Lindsey, I. N. Wright Survey, wildcat 9½ miles northeast of Jacksboro, drilled sand showing oil from 3,220-24 ft. and was running a drill-stem test. A third producer for Glasscock Bend pool of northeastern Jack County, is the C. G. Glasscock and Pontiac Refining Co. 3 Morris, J. U. Fields Survey, northwest offset to the discovery well. The well flowed at the rate of 24 bbl. of oil daily through perforations from 5,812-30 ft.

R. W. Brown 1 Hart Ranch, Section 23, Block 4, T&P Survey, wildcat 3 miles west of Brad in Palo Pinto County, on a 1-hour drill-stem test from 2,095-2,107 ft. has a strong blow of gas in 5 minutes. Recovery was 300 ft. of heavily oil and gas-cut mud and 300 ft. of salt water.

Mudge Oil Co. 1-B Ross Sloan, Block 914, TE&L Survey, southwest outpost to Odell field of southern Throckmorton County, ran a 1-hour test from 4,046-55 ft. and recovered some gas, 90 ft. of oil-cut mud, and a slight trace of free oil.

J. R. & Adam Seitz et al, 1 Glenn D. Woodson, Uriah Burns Survey, ½-mile west extension to Sherman pool of Grayson County, opened the fifth, and deepest, Strawn pay for the pool. Plug was drilled from casing set at 4,860 ft. and hole swabbed dry. In 1 hour the hole filled 400 ft. with oil from Strawn pay at 4,860-70 ft. Testing on swab continued in an effort to make the well flow.

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) SUCCESSFUL WILDCATS

Baylor County: American Liberty Oil Co. 1 J. S. Criswell, Sec. 97, T&NO Sur., 8

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mi. S Seymour, pumped 15 bbl. 44°-gravity oil a day, perf. 5,162-72 ft., TD 5,575 ft., gas-oil ratio 500 to 1.

Coleman County: W. E. Stepps & T. J. Maxwell et al 1 Mrs. Geo. Sparkman et al, S. Crooks Sur., 2½ mi. S Coleman, flowed 133 bbl. 43°-gravity oil a day, top pay 2,100 ft., TD 2,117 ft., elev. 2,096 ft.

Cooke County: Snuggs & Neal, Inc., 2 G. A. LeMaster et al, Blk. 2, Lge. 7, University Lds., A-1452, 10 mi. NE Gainesville, pumped 119 bbl. 43°-gravity oil a day, top of pay 2,747 ft., TD 2,754 ft., elev. 771 ft.

Nolan County: Iowa-Payne Oil Co. 1 N. L. McLeod, Sec. 44, Blk. 19, T&P Sur., 2 mi. S Trent, pumped 46 bbl. 44°-gravity oil a day, top of pay 5,125 ft., TD 5,750 ft., Flippen 3,070 ft., Palo Pinto 4,760 ft., Ellenburger 5,725 ft., elev. 1,997 ft.

Stephens County: Texas & Pacific Coal & Oil 1 Garvin Thomas Farm "A," Sec. 1125, TE&L Sur., 3 mi. SW Eliasville, pumped 5 bbl. 41°-gravity oil a day, top of pay 4,392 ft., TD 4,605 ft., Barnett 4,241 ft., Mississippian 4,247 ft., elev. 1,102 ft.

Taylor County: Geochemical Survey 1 J. S. Pickley, Blk. 1, Lge. 124, Grimes CSL, 1¾ mi. NE Merkel, flowed 102 bbl. 42°-gravity oil in 8 hrs., top of pay 2,709 ft., elev. 1,824 ft.

Young County: T. A. Wright et al 1 M. K. Graham, Sec. 2390, TE&L Sur., 5 mi. N Murray, pumped 22 bbl. 31°-gravity oil a day, gas-oil ratio 600 to 1, top of pay 4,105 ft., TD 4,603 ft., Caddo 3,756 ft., Mississipian 4,510 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) WILDCAT FAILURES

Brown County: Lorena Busbee, Tr., 1 W. R. Chambers, Sec. 22, BBB&C Sur., 3 mi. W May, dry, TD 2,916 ft., Caddo 2,245 ft., elev. 1,602 ft.

Clay County: P. P. Langford, Jr., 1 G. F. Harrigan, Ruben A. Brown Sur. A-14, 5 mi. NE Byers, dry, TD 1,900 ft.

Cooke County: Harvey Drlg. Co. and Kay Kimbell 1 C. J. Westerlake, Hiram Walker Sur. A-1082, 3½ mi. NW Burns City, dry, TD 2,631 ft.

Eastland County: Gilchrist Drlg. Co. et al 1 T. L. Barton, Sec. 24, Blk. 1, H&TC Sur., 5 mi. NW Gorman, dry, TD 1,492 ft., elev. 1,574 ft.

Haskell County: Kingery Drlg. Co. et al 1 R. C. Speck, A. Slaydon Sur. 58, 7 mi. W Rochester, dry, TD 5,014 ft., Saddle Creek 2,620 ft., Hope 2,830 ft.

Jack County: Russell McGuire 1 A. J. Abernathie, M. Brown Sur. A-59, 9½ mi. SE Jacksboro, dry, TD 4,904 ft.

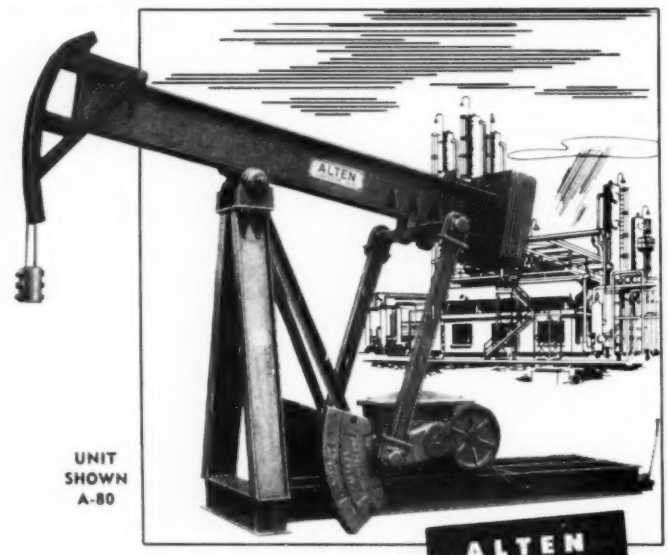
Russell McGuire 1 W. R. Richards, T. P. Kuykendall Sur. A-327, 5 mi. SE Jacksboro, dry, TD 5,304 ft., Caddo 4,674 ft.

Jones County: Kingery-Patterson & Witherspoon 1 R. M. Harrell, Sec. 7, OAL Sur., 5½ mi. S Avoca, dry, TD 2,912 ft., King 2,278 ft., Reef 2,818 ft.

A. J. Slagter, Jr., 1 R. L. Milstead, Blk. 8, Lge. 360, Goliad CSL, 13 mi. W Anson, dry, TD 5,900 ft., Saddle Creek 5,735 ft., Strawn 5,260 ft., elev. 1,939 ft.

Shackelford County: G. E. Kadane & Sons 1 Merrick Davis "T," Sec. 21, Blk. 12, T&P Sur., 7 mi. W Albany, dry, TD 5,137 ft., Caddo 4,606 ft., Ellenburger 5,126 ft., elev. 1,945 ft.

Taylor County: Star Oil Co. 1 W. L. Ray, Sec. 242, Blk. 64, H&TC Sur., 4½ mi. NW Shep, dry, TD 4,305 ft., elev. 2,352 ft.



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MICHIGAN

New Shallow Traverse Field Appears Assured

MOUNT PLEASANT.—A new shallow Traverse field in southwest Michigan appeared assured as W. Spencer Cook, Inc., and H. L. Wadsworth 1 Marshall, SW NE NE 11-1n-16w, Casco Township, Allegan County, flowed at the rate of 16 bbl. of oil an hour following acidization in the Traverse with 500 gal.

Top of the objective lime was logged at 1,183 ft. and hole was bottomed out at 1,187 ft. Natural, well made one or more flows of 40 bbl. After being flowed at the 16 bbl. rate for several hours, production was gradually pinched back to 5 bbl. an hour, rate at which operators hoped to hold daily production rate. No salt water was showing.

Cook, Inc., and Wadsworth started two offset development tests, with the announcement that tools were being moved to the south offset, NW SE SE 11-1n-16w, and to the second 10-acre location east, the SE NW NW 12-1n-16w.

First failure for the Reed City zone in the Paris Traverse oil pool, Mecosta County, was reported this week as Cities Service Oil Co. logged water in this zone at a total depth of 3,545 ft. Hole filled 400 ft. with salt water in 10 minutes between 3,544-45 ft. Test was scheduled to be plugged back to approximately 3,436 ft. where a 500,000-cu. ft. gas pay will be acidized. Dundee was logged at 3,404 ft.

This well, the 1 Brennan, SE NE NW 28-16n-10w, diagonal southwest offset to Paris field Traverse zone discovery, appeared to have missed a Traverse oil pay, but if the Dundee gas proves noncommercial, Traverse zone may be retested.

Plugback operations in the Traverse were ordered for Don Rayburn 1 Cooper-Lucht, SW SW NE 29-17n-4e, Pinconning Township wildcat, Bay County, before continuing production tests in this zone. About 125 bbl. of oil and as much or more salt water were flowed from the well on initial tests. Traverse was logged at 2,107 ft. and hole was bottomed out at 2,242 ft.

MICHIGAN SUCCESSFUL WILDCAT

Allegan County, Casco Township: W. Spencer Cook, Inc., and H. L. Wadsworth 1 Marshall, SE NE NE 11-1n-16w, Trav-

erse 1,183 ft., 360 bbl. after acid, TD 1,187 ft.

MICHIGAN WILDCAT FAILURES

Arenac County, Augres Township: W. L. McClanahan 1 State-Augres, C NW SW 2-19n-6e, dry in Richfield, TD 4,195 ft.

Bay County, Gibson Township: Raymond V. Miller 1 Boeing et al, NE SE NE 22-18n-3e, Dundee 2,895 ft., dry, TD 3,136 ft.

Kent County, Gaines Township: Don Rayburn 1 Dochow, NW NW NW 36-5n-11w, Traverse 1,983 ft., dry, TD 2,030 ft.

Muskegon County, Blue Lake Township: Muskegon Oil Corp. 1 Hilt, SE SE NW 34-2n-16w, Traverse 1,865 ft., dry, TD 1,952 ft.

Ottawa County, Robinson Township: Basin Oil Co. 1 Martinia, SW SW NW 36-7n-15w, Traverse 1,641 ft., dry, TD 1,654 ft.

Pennsylvanian. Original plans called for a test to granite at around 3,600 ft.

New locations.—There were 16 new locations during the week, with 8 in Wyoming, 4 in Montana, 2 in Utah, and 1 each in Colorado and western Nebraska. The western Nebraska wildcat is Roberts Brothers 1 Elsasser, C NE NW 25-14n-50w, in the Sidney area, 3 miles northwest of the town of Sidney and 8 miles southwest of Ohio Oil Co.'s Gurley field. In Colorado, R. E. Havenstrite has made location for 3 Ryles, C NW NE 2-3n-86w, an offset to the recent Oak Creek, Routt County, discovery well. Other locations were for pool wells.

Completions.—Twenty-nine wells were completed, with 20 in Montana, 8 in Wyoming and 1 in Utah. In Montana three of the wells were wildcat failures, with one a wildcat success. The latter well was Hagerty et al's South Cut Bank Madison discovery, which made 15 bbl. of oil daily. The well is the first to find Madison production in this area. In Wyoming, Mule Creek Oil Co. et al completed their West Fiddler Creek discovery, 3 miles west of production, with a gage of 50 bbl. of oil daily.

WYOMING SUCCESSFUL WILDCAT

West Fiddler Creek, Weston County: Mule Creek Oil and H & H Drilling Co. 1 Martin-Conley, SE NE NE 25-46n-66w, 5,717 TD, flowed average 50 bbl. oil per hour, 7-in. csg. at 5,684, Newcastle 5,685-97.

MONTANA SUCCESSFUL WILDCAT

Cut Bank, Galcier County: Hagerty 1 Tribal 431, SW SW SE 4-31n-5w, 2,991 TD, IP 15 bbl. oil per day, Colorado 485, Kootenai 2,220, Moulton 2,685-2,700, Sunburst 2,785, Ellis 2,820, Madison 2,989.

MONTANA WILDCAT FAILURES

Reno area, Carbon County: California Ex-

ROCKY MOUNTAIN

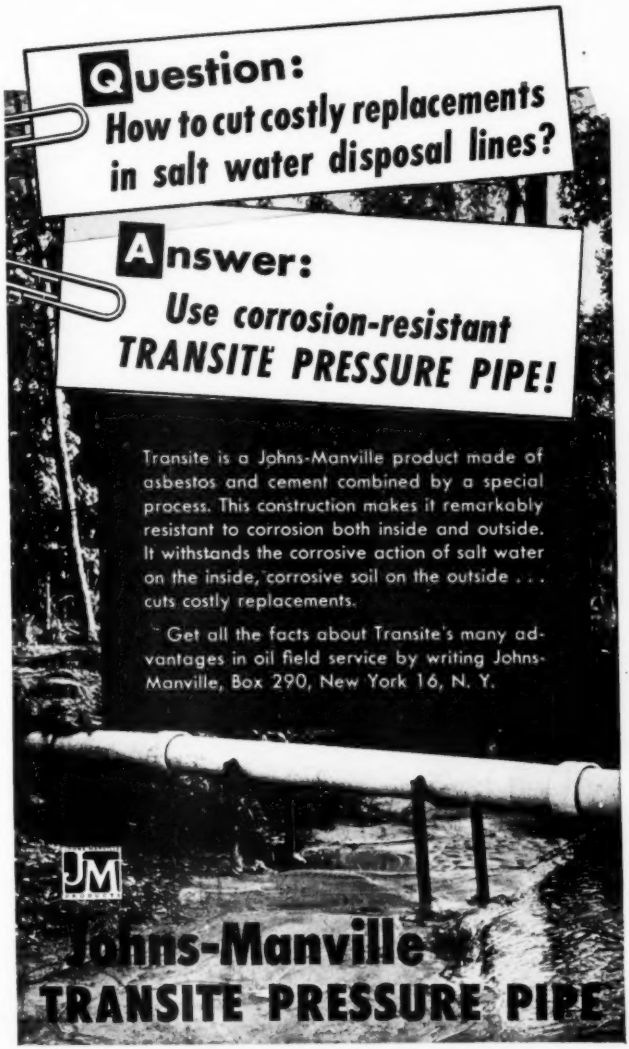
Sundance Discovery Causes Big Interest in Wyoming

DENVER—Discovery of oil in the basal Sundance by Atlantic Refining Co. at its 1 State 36, NE NW NW 36-35n-66w, in the Lightning Creek area, Niobrara County, Wyoming, has caused considerable renewed interest in the southeastern Powder River Basin area of that state. The well topped basal Sundance at 3,872 ft. (sample) and on drill-stem test in the top 10 ft. of sand the well made 700 ft. of 41.7°-gravity oil and 100 ft. of mud in 35 minutes. A total of 47½ ft. of saturated sand was cored and the operator is preparing to take another 20 ft. of core at 3,927 ft., total depth. It is expected that this later core may be through the Sundance and if so the operator plans to run casing for further tests of the formation. This area is 10 miles southwest of Lance Creek field, where oil is produced from Sundance and Minnelusa formations. The field was for some time the largest oil-producing field in the Rocky Mountains, but has now cut back to around 8,000 bbl. of oil daily from these formations. Atlantic has an extensive lease block through the Lightning Creek area and has drilled four shallow Muddy sand failures in the area recently.

Gas was recovered on drill-stem test of Husky Refining Co.-Continental Oil Co. 1 Unit, C SW NW 11-14n-193w, Salt Wells area, Sweetwater County, with an estimated flow of 10,000,000 cu. ft. daily. Top of Frontier was reported at 5,798 ft., and the drill-stem test was made between 5,800-37 ft. Flowing pressure was 1,100 lb. and shut-in pressure 2,400 lb. on the test. Gas was discovered in South Baxter Basin, 15 miles northwest of Salt Wells, in 1926, but the majority of gas in the Baxter Basin fields is produced from Sundance, the original objective of Husky and Continental's well.

At Happy Springs Unit, west of Crooks Gap field, Fremont County, Wyoming, Sinclair Oil & Gas Co. recovered 255 ft. of 35.3°-gravity dark green oil and 210 ft. of 50 per cent oil-cut mud with some gas on 1 hour 15 minute drill-stem test from lower Frontier. The Frontier was topped at 5,195 ft. and the test made between 5,888-5,917 ft. The well is located on a 10,000-acre unitized block immediately west of Crooks Gap field, where Sinclair produces oil from the Muddy formations. Sinclair will drill the well deeper and probably test Dakota prior to completion of the Happy Springs wildcat.

Phillips Petroleum Co. is testing on an interesting wildcat in a new province of the Rocky Mountains. The well is immediately west of Yellowstone National Park in southern Gallatin County, Montana, and is located in the SE NW SE 11-9s-3e. The well is a tight hole, but is reported testing at 1,096 ft., total depth, possibly in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ploration 1 Pierce, C NW NE 13-4s-24e, completed as a water well, 1,379 TD. Morrison 150, Ellis 320, Gypsum Springs 635, Chugwater 780, Embar 1,040, Tensleep 1,074, Amsden 1,178, Madison 1,316.

Devils Pocket, Musselshell County: William Hanlon 3 Govt., NW NW SW 10-10n-22e, 103 TD, completed as a water well.

Primitive Dome, Rosebud County: Primitive Oil Co. 2 Heckler, NW NW NW 6-11n-34e, 2,583 TD, plugged and abandoned, no sand.

UTAH WILDCAT FAILURE

Green River, Grand County: Amerada Pet. Corp. 2 Unit, NE SW NW 2-22s-16e (SE Lot 5), 5,896 TD, plugged and abandoned, flowed 100 bbl. salt water per hour. Curtis 720, Entrada 810, Carmel 1,330, Navajo 1,475, Wingate 1,960, Chinle 2,405, Fault zone 2,640-3,180, Moenkopi 2,670, Coconino 2,880, Cutler-Rico 3,110, Hermosa 3,195, Paradox 3,750, Salt 5,054.

OKLAHOMA

Elk City Field Extended Another Mile Westward

EXTENSION of the Elk City field in Beckham County another mile west has been assured at Shell Oil Co. 1-B State, C NE SW 8-10n-21w, where drill-stem tests of two of the field's producing horizons resulted in substantial flows of oil, condensate and gas. The new well is west of the same company's 1 McKenzie, completed last May as a 1½-mile northwest extension, and proves the field to stretch at least 8 miles in a northwesterly-southeasterly direction. It will be the twelfth well for the field.

Latest test was at 9,546-9,646 ft., in which the well flowed at the rate of 1,040 bbl. of 61 condensate and 6,810,000 cu. ft. of gas per day through ⅜-in. bottom hole and ½-in. top hole chokes with a tubing pressure of 1,950 psi. Previously, at 9,380-9,472 ft., it flowed at the rate of 1,152 bbl. of 57.8 oil and 4,555,000 cu. ft. of gas daily through the same chokes with a pressure of 1,380 to 1,400 psi. Following the test, when pulling pipe, 1,980 ft. of oil and 90 ft. of oil-cut mud was recovered.

Okfuskee County, in the central part of the state, where active exploration in the last several months has resulted in a succession of small oil and gas discoveries, has another possible new pool at M. B. Armer and Culham Petroleum Co. 1 Seran, SW NE SW 30-13n-9e, where testing of broken Cromwell sand at 3,420-60 ft. is under way. In a previous drill-stem test of the pay at 3,423-60 ft., with tool open 90 minutes, 180 ft. of clean oil and 20 ft. of oil-cut mud was recovered. Cores showed saturated sand at 3,420-32 ft., a 3-ft. lime break at 3,232-35 ft., and 25 ft. additional saturated sand at 3,435-60 ft. In the meantime, hole has been drilled to the Hunton lime and plugged back to 3,460 ft. with casing at 3,420 ft. It is 3 miles northeast of the Valley Grove pool.

Another new pool also is in the making in Jefferson County, in the southern part of the state, where C. D. Neff (trustee) 1 Clark, SE SE NW 8-4s-8w, encountered good porosity and oil showings both in the Canyon lime at 3,730-60 ft. and granite wash at 3,930-60 ft. Casing, cemented at 3,980 ft., is being perforated for production tests. Hole was drilled to 4,293 ft., with Arbuckle detrital being topped at 4,062 ft. (elevation 901 ft.).

First confirmation for the new East Wanette pool in Pottawatomie County flowed 75 to 100 bbl. per day through casing in initial production tests from Layton sand at 3,108-26 ft. It is B. S. Jordon 1 Wayman, SW NW NW 29-6n-3e, a northeast diagonal 10-acre offset to the discovery well (Bert Ashton 1 Neal), completed last April as a 35-bbl. pumper in the same sand, topped at 3,110 ft.

In southeastern Garvin County, 8 miles west of Wynnewood, Eddie Fisher has what may prove to be a shallow Pennsylvanian sand discovery in his 1 Cox, NE NE NE 18-2n-3e. When drilling out plug with cable tools to test broken sand at 1,430-85 ft. which showed good oil stains on cores, the well blew the tools out of the hole and sprayed some oil.

OKLAHOMA SUCCESSFUL WILDCATS

Cimarron County: Bay Petroleum 1 Parkes, NE NE SW 34-4n-8ecm, flowed 52 bbl. of oil per day from Keyes at 4,765-4,819 ft., TD 4,843 ft.

Garvin County: Stanolind 1 Richardson unit, SW SE NE 1-1n-1w, flowed 80 bbl. of oil per day from second Deese sand at 4,532-89 ft., TD 4,664 ft.

Hughes County: Mid-Continent 1 McCosar, SW SW NE 14-8n-10e, flowed 9 bbl. of distillate from Cromwell at 3,250-64 ft., TD 3,293 ft.

Okfuskee County: Mid-Continent 1 Weehunt, NW SE SE 6-11n-11e, pumped 60 bbl. of oil per day from Wilcox at 3,752-60 ft., TD 3,760 ft.

Oklahoma County: Peppers 1 Boles, NW NW SE 9-12n-2w, flowed 200 bbl. of oil per day from Misener and Bois d'Arc at 6,390-6,430 ft., TD 6,485 ft.

Extension to Witcher—Peppers 1 Hightower, NW NE NW 1-12n-3w, flowed 153 bbl. of oil per day from unconformity and Bois d'Arc at 6,352-95 ft., TD 6,388 ft.

Osage County: Oliphant et al 2 (Osage), W 2 SE 18-26n-5e, pumped 20 bbl. of oil per day from Layton at 2,372-86 ft., TD .

OKLAHOMA WILDCAT FAILURES

Atoka County: Blauner 2 Benson, NW NW SE 22-1s-12e, dry, TD 765 ft.

Cleveland County: Teepee Drilling 1 Bradshaw, C SE SE 33-7n-1w, dry, TD 155 ft.

Comanche County: Werner 1 Wishford, SW SW SE 3-1n-11w, dry, TD 405 ft.

Pearson 1 Hill, NW NW NW 5-1n-12w, dry, TD 175 ft.

Jefferson County: Wilcox 1 Stone, NE NW SW 6-5s-7w, dry, TD 2,613 ft.

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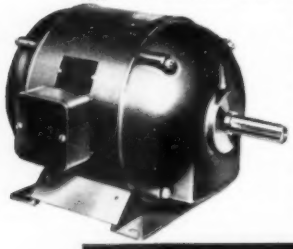

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Garfield County: H. E. R. Drilling 1 Gaines, SW SW NE 23-21n-3w, dry, TD 3,885 ft.

Garvin County: Continental Production 1 Barnett, SE SW SW 24-3n-1w, dry, TD 4,205 ft.

Grant County: Anderson-Prichard 1 Joseph, NE NE SW 17-29n-3w, dry, TD 4,892 ft.

Kingfisher County: King 1 Truesdell, C SW SW 36-17n-6w, dry, TD 4,014 ft.

Kiowa County: Ferguson 1 Harris, NW NE NE 11-6n-17w, dry, TD 509 ft.

LeFlore County: LeFlore M-1 Hughes, C NW NW 21-6n-27e, dry, TD 6,352 ft.

Lincoln County: Fordee-Rhoades 1 Jergins, NE NE NW 9-12n-5e, dry, TD 3,442 ft.

Woods 1 Webbs, NW NW SW 1-16n-5e, dry, TD 3,717 ft.

Trigg et al 1 Kroman, SE SW SE 4-16n-5e, dry, TD 3,732 ft.

Logan County: Deck 1 Lesh, NW NW SE 3-16n-1w, dry, TD 5,723 ft.

McClain County: Republic Natural Gas 1 Harris, C SE NW 34-5n-4w, dry, TD 11,251 ft.

KANSAS

Stafford County Wildcat Swabs 22 Bbl. per Hour

HARTMAN AND ASSOCIATES appear to have opened another new pool in Stafford County in their 1 Jordon, NW NW SE 26-21-12, 2 miles southeast of the Stafford pool. With casing perforated at 3,520-28 ft. in the Lansing and formation acidized with 500 gal., the well swabbed 22 bbl. per hour for 3 hours on initial test. Lansing was topped at 3,507 ft. (—1,636 ft.). Hole was drilled to 4,132 ft. in the Arbuckle, topped at 4,100 ft., but the latter formation proved dry, and hole was plugged back to the upper pay with casing at 3,745 ft.

Barbara Oil Co. 1 Page, SW SW SW 15-33-11, 7 miles east of the Boggs pool in Barber County, had a 1,000-ft. oil fill-up after perforating casing at 4,346-65 ft. in Mississippian lime, and looks like another new pool opener. Mississippian was topped at 4,475 ft. (—3,040 ft.). Bottom of the hole is 4,610 ft., where casing is cemented. The discovery is 11 miles north of the Oklahoma line.

In Russell County, 1 mile east of production of the Trapp field, El Dorado Refining Co. 1 Ely, NE NE NE 15-15-13, bailed 2 bbl. per hour following two acid treatments, totalling 2,000 gal., after perforating casing at 2,948-52 ft. in the Dodge zone, topped at 2,944 ft. (—1,127 ft.). Oil rose 700 ft. in the hole in 12 hours following the initial acid treatment of 500 gal. Previously, casing was perforated at 3,081-85 ft. in the Lansing, which tested water with only a small show of oil and gas. Water also was found in the Arbuckle at 3,293-3,319 ft.

A third well and ¼-mile south extension from the discovery producer appears certain for Carter Oil Co.'s new Davis Ranch pool in Wabaunsee County in the northeastern part of the state. The well, 1-B Davis, SW NE NW 1-14-10e, topped the Viola lime, the producing zone, at 3,186 ft. (—1,773 ft.), 9 ft. higher than in the discovery well. A 2-hour drill-stem test of the zone at 3,189-3,208 ft. resulted in a recovery of 2,858 ft. of oil and 50 ft. of oil-cut mud. A second test at 3,209-20 ft. yielded only 30 ft. of mud. Casing has been run to bottom at 3,220 ft. Carter's second well, 2-A Davis, now being put on the pump for completion after successful swabbing tests, is north of the discovery well.

Potential tests have been completed for three additional new discovery wells. Texas Pacific Coal & Oil Co. 1 Gabrielson, SE SW NW 33-17-3, McPherson County, discovery well of the Bonaville pool, made 108 bbl. in 24 hours from Simpson sand topped at 3,554 ft. (—2,029 ft.), with hole open at 3,557-3,570 ft. M. B. Armer 1 Dreiling, SE SE NE 21-14-16, discovery well of the Dreiling pool, southeastern Ellis County, made 173 bbl. per day from Arbuckle at 3,377-83 ft. Arbuckle was topped at 3,366 ft. (1,502 ft.). Shields & Anschultz, NW SW SW 25-13-14, Russell County, made 108 bbl. per day from Arbuckle at 3,273-88 ft. (—1,443-58 ft.). It is 1½ miles east of the Russell pool.

KANSAS SUCCESSFUL WILDCATS

Ellis County: Huber & Crowe Drilling Co. 1 Chrisler, NW NW SW 22-11s-16w, 54 bbl. of oil per day from Lansing at 3,100-12 ft., TD 3,460 ft.

Morton County: Cities Service Oil Co. 1 Morton County, NW NW SE 2-34s-41w, 8,520,000 cu. ft. of gas per day from Permian, TD 2,690 ft.

Pawnee County: Sunray Oil Corp. 1 Brown, NE NE SW 28-21s-16w, 25 bbl. of oil per day from Arbuckle at 2,877-78 ft., TD 2,881 ft.

Russell County: R. H. Shields et al 1 Anschutz, NW SW SW 25-13s-14w, 107 bbl. of oil per day from Arbuckle at 3,273-75 ft., TD 3,288 ft.

Stafford County: Westgate-Greenland 1 Grow, SW SW SE 16-21s-13w, 132 bbl. of oil per day from Arbuckle at 3,705-12 ft., TD

Ferrell Drilling et al 1 Hahn, NW NW SW 10-22s-13w, 408 bbl. of oil per day from Arbuckle at 3,774-83 ft., TD

Wilson County: Charles Davis & Robinson, NE NE SW 21-27s-14e, 12 bbl. of oil per day from Mississippian at 1,230-1,300 ft., TD.

KANSAS WILDCAT FAILURES

Butler County: Dunn & Strait 1 Markley, NW SE NW 36-27s-3e, dry, TD 3,005 ft.

Harper County: Earl Wakefield et al 1 Ryan, SW SW NW 33-31s-9w, dry, TD 4,767 ft.

Gulf Oil Corp. 1 Dent, NE NE NE 21-32s-7w, dry, TD 5,050 ft.

Pratt County: Cities Service Oil et al 1 Park, NW SE SW 14-27s-11w, dry, TD 4,532 ft.

Rooks County: Virginia Drilling Co. 1

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Wickstrom, NW NW SE 20-8s-18w, dry, TD 3,577 ft.
Brunson and N.C.R.A. 1 Havlas, NW NW SW 4-9s-18w, dry, TD 3,518 ft.
Bennett & Roberts 1 North, NW SW 36-9s-18w, dry, TD 3,665 ft.
Stafford County: Alpine Oil & Royalty et al 1 Figger, NE NE SE 28-22s-11w, dry, TD 3,706 ft.
Sumner County: Dave S. Alter 1 Crowdus, SW NW NW 10-30s-1w, dry, TD 3,912 ft.
Whiteside and Martin 1 Louterbach, NE NE SW 33-32s-2w, dry, TD 4,408 ft.
Gillespie & Sons et al 1 Woodbridge, SE SE SW 2-33s-3w, dry, TD 4,606 ft.

WESTERN NEBRASKA WILDCAT FAILURE

Cheyenne County: Frontier-Ideal 1 Baker, NE NE SE 20-16n-49w, dry, TD 4,615 ft., Niobrara 3,757 ft., Timpas 4,005 ft., Codell 4,105 ft., Greenhorn 4,270 ft., sand 4,541 ft., sand and shale 4,580 ft., sand 4,600 ft.

LA.-ARK.

Sligo Field Well To Test Cotton Valley

SHREVEPORT.—Union Production Co. 1 Section 13 "Unit," 13-17n-12w, Bossier Parish, Cotton Valley test in Sligo field, was drilling below 5,840 ft. in the Travis Peak topped at 5,340 ft.

Ohio Oil Co. and Gulf Refining Co. 1 O. L. Martin, Smackover test in Claiborne County, was coring at 4,648 ft. in the Rodessa. E. C. Laster et al, 1 C. F. Grimes, 26-15n-14w, 3 miles southeast of Stonewall, DeSoto Parish, was drilling in the Lower Glen Rose below 5,075 ft.

Southwest Gas Production Co. et al, 1 J. L. Liggin, 9-20n-2w, 5 miles northeast of Dubach, Lincoln Parish, topped the Travis Peak at 4,634 ft. and the Pettit at 4,438 ft. Operators were drilling below 6,410 ft.

Union Oil Co. of California 1 Weatherly-Anderson, 38-12n-12e, 9,200-ft. test in Tuscaloosa field of Tensas Parish, with total depth of 8,823 ft., acidized perforations from 8,795-8,810 ft. with 1,000 gal. of mud acid. Operator swabbed 50 bbl. of fluid, of which 7 bbl. was heavy oil, in 12 hours. The well was plugged back to 8,750 ft. and preparations are being made to perforate from 8,487-92 ft. Southwest Gas Production et al, 1 J. F. Weldon, 24-21n-3w, 1½ miles southeast of Bernice, Union Parish, was testing the Cotton Valley with total depth of 9,087 ft.

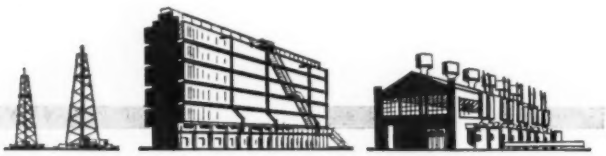
In Arkansas, Lion Oil Co. 1 Loftin, 34-18s-18w, 4 miles southwest of Schuler field, Union County, ran a 15-minute drill-stem test of the Smackover from 8,500-15 ft. and recovered 1,800 ft. of salt water and 30 ft. of mud. Buckner was topped at 8,352 ft., Jones at 8,408 ft. and Smackover at 8,492 ft.

NORTH LOUISIANA WILDCAT FAILURES

De Soto Parish: Coats & Harrell Drlg. Co. 1 E. R. Nelson, 35-15n-13w, dry, TD 5,005 ft., Rodessa 4,840 ft., elev. 191 ft.
Union Parish: Sklar Oil Co. et al 1 David Smith, 13-23n-3w, dry, TD 2,246 ft.

ARKANSAS WILDCAT FAILURES

Drew County: Guad Drlg. 1 Crossett Lbr. Co., 23-13s-6w, dry, TD 4,192 ft., Meakin 3,908 ft., Tokio 3,998 ft., elev. 191 ft.
Ouachita County: C. L. Waggoner et al 1 T. Gaughn, 36-13s-48w, dry, TD 1,501 ft.
Union County: Don D. Montgomery et al 1 J. K. Mahony, 25-17s-18w, dry, TD 7,631 ft., Travis Peak 4,108 ft., Cotton Valley 5,386 ft., Buckner 7,485 ft., Smackover 7,546 ft., elev. 271 ft.



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EASTERN TEXAS

New Red Springs Field Has Confirmation Well

DALLAS—Cities Service Oil Co. 1 D. Balfour (Tozier), S. M. Grace Survey, 5.7 miles northwest of Winona, Smith County, confirms the discovery of Red Springs field. The discovery well was Humble Oil & Refining Co. 1 Everett Wintters et al, 934 ft. northward in the William Price Survey. The 1 Balfour is producing from the Rodessa. On official test it flowed 229 bbl. of 44°-gravity oil a day. Gas-oil ratio was 996:1. Total depth is 9,515 ft. Delta Drilling Co., also seeking Rodessa pay in the Red Springs area at 1 J. M. and C. M. Haddad, was coring below 9,353 ft. It is 1,261 ft. east of Humble 1 Wintters in the Price Survey. Bobby Manziel 1 B. D. Berryhill, Samuel Epps Survey A-335, wildcat 5½ miles northeast of Starryville, is dry at 3,986 ft. On a drill-stem test from 3,729-49 ft. recovery was 15 ft. of mud with a slight rainbow oil oil.

Humble will drill a second wildcat on its big holdings in Nacogdoches County, where the company has opened a gas-distillate pool. The wildcat is 1 Mary R. Sanders, 1,320 ft. from the north and west lines of Charles Holmes Survey, 3 miles east of Trawick. The 1 Sanders is 4 miles east and slightly north of Humble 1 Crawford, Z. Bennett Survey, completed to flow 47,000,000 cu. ft. of gas and 235 bbl. of 49°-gravity oil daily from the Pettit lime.

Continental Oil Co. 1 Royall National Bank, A. G. Monroe Survey, Travis Peak wildcat in Anderson County, ½ mile southeast of Tennessee Colony, was drilling below 7,268 ft. in Paluxy shale. Top of Goodland was called at 6,620 ft. and the Paluxy at 6,890 ft. Lone Star 1 Lillian Pinkston, T. J. Rusk Survey A-47, 2½ miles east of Teluca, Cherokee County, is dry at 4,320 ft. in the Woodbine, topped at 4,271 ft.

E. B. Germany & Sons 1 Mrs. Pearl

Skinner, A. Gray Survey A-290, topped the Comanchean at 5,273 ft. and was drilling below 5,962 ft.

EAST TEXAS (DISTRICTS 5, 6 & 6-P) WILDCAT FAILURES

Cherokee County: Weiner Fryer & Wake Oil Co. 1 Mrs. Lizzie Fountain, L. Rhodes Sur., 12 mi. SE Jacksonville, dry, TD 7,593 ft., Hill 7,381 ft., Gloyd 7,460 ft.

Red River County: Stratton Drlg. Co. 1 Ross G. Mitchell, A. J. Witt Sur., 12 mi. NE Clarksville, dry, TD 2,160 ft., elev. 412 ft.

Shelby County: P. H. Pewitt 1 Alice Ford, E. F. Smith Sur., 6 mi. NE Center, dry, TD 6,480 ft., Jeter 5,465 ft., Gloyd 5,492 ft., James 5,905 ft., elev. 253 ft.

CANADIAN FIELDS

Canada's Deepest Producer Is Country's Best Gas Well

CALGARY—Canadian Gulf Oil Co.'s second well at Pincher Creek appears to confirm the presence of a major wet gas field in that region. The well, Gulf-Walter Marr 1, Canada's deepest successful well ever drilled is also by far its largest wet gas well completed. Located in LSD 1, 29-4-29w4, about 7 miles northwest of the original Gulf-Pincher Creek discovery well, the Marr venture was drilled to 12,768 ft. on a Madison limestone anticline.

Potential of the Gulf-Walter Marr 1 well was calculated conservatively to be 83,000,000 cu. ft. of natural gas per day. The calculated potential for distillate accompanying the gas was rated at 3,000 bbl. daily, gravity 52½°.

Bottom-hole pressure during testing was recorded at 4,868 psi. at producing depth of 12,473 ft., while bottom-hole temperature was 188° F. The pressure and temperature are comparable to those at Gulf-Pincher Creek 1 discovery well, 7 miles southeast, which rates a calculated potential of 55,000,000 cu. ft. of gas and 1,500 bbl. of distillate.

Potentials for the Marr well are based on a series of recent brief flow tests made following plugging off the water-bearing lower porous Madison porosity, and treating the upper porous zone (200 ft.) with 3,000 gal. of acid. No attempt was made to flow the well wide open. Tests were made through chokes ranging from 26/64-in. to 22/64-in. The distillate was clean, indicating that cementing back from original depth of 12,768 ft. had effectively shut off water from the lower porous.

The field, comparable in type of structure to the gas cap of the Turner Valley Madison limestone field 25 miles southwest of Calgary, has now been established by Gulf's Pincher Creek 1 and Walter Marr 1. Guesstimates of reserve now are placed at up to 1,000,000,000 cu. ft. of gas, plus millions of bbl. of distillate. Testing is currently being continued at the Marr well.

During the past week there were seven field development wells that completed drilling and were placed on steady yield, six in the Redwater oil field and one at Leduc. Three new wildcats commenced drilling this week, all in the Central Alberta plains, on Imperial Oil, Ltd., farmout agreements.

Amerada Petroleum Corp. obtained its first Alberta oil production when two of its Redwater completions were placed on production with initial potential rate of 1,306 bbl. daily. Imperial Oil, Ltd., also started two additional Redwater wells on steady yield, with potential ratings of 1,368 and 1,005 bbl. daily. Western Leaseholds, Ltd., added another well to its growing number of Redwater producers, rating 1,009 bbl. daily when it was placed on open flow test. The Pacific-Atlantic-Sunray Calvan team's latest producer at Redwater yielded 300 bbl. daily on a preacid test this week. At Leduc, Frank Petroleums, Decalta Oils and Northern Extension started their third D2 Devonian zone well on yield with an open flow of 500 bbl. daily.

R. W. Development Co., a new Calgary independent, is drilling its first well near Volmer, about 15 miles northwest of Edmonton, in LSD 7, 16-55-25w4. Woodbend Devon Oils, Ltd., a private Edmonton firm, spudded its second Alberta venture about 15 miles northeast of that city, near Carbondale, in LSD 7, 10-55-24w4. Pan Western Oils, Ltd., is moving in equipment to start drilling 30 miles southeast of Edmonton, in the Kavanagh area, LSD 16, 16-48-24w4.

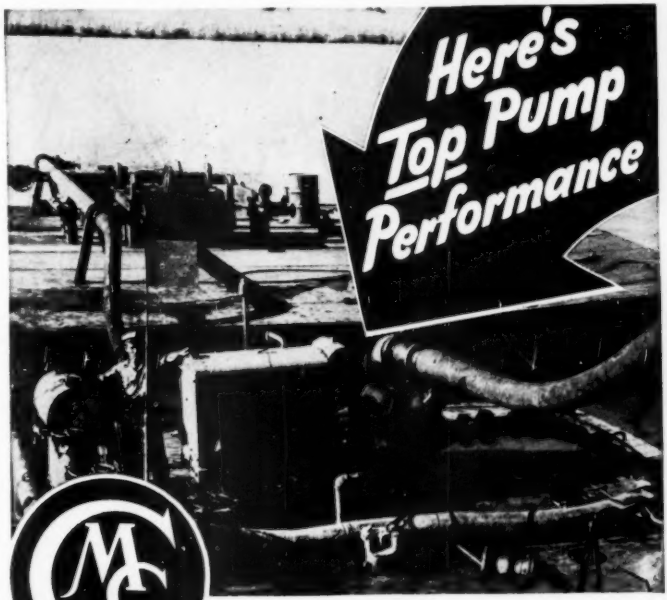
Stettler.—Casagam Oils, Ltd., has obtained an indicated oil discovery in the Lower Cretaceous sands at its wildcat near Stettler, about 105 miles northeast of Calgary. The well, in LSD 5, 7-39-19w4, about 7 miles northeast of the Gulf-Ellis 1 dual zone Devonian discovery, was drilled to 5,350 ft. and plugged back to the Lower Cretaceous. During the last few days crew has been gun-perforating and bailing the well, in attempts to place it on production. Gravity of the oil during bailing run was 28.5°, but the well would not blow, due to low gas pressure. Best bailing results, after perforating from 4,203-19 ft. with 72 shots, was 8 bbl. hourly. The well, backed by Windsor and Detroit interests, is now awaiting tubing and pump unit, prior to running pump test of potentiality.

CANADIAN WILDCAT FAILURE

Barnsdall-Honolulu-Seaboard-Lyle Lake 1, LSD 10, 24-72-17w4, dry, TD 3,121 ft.

EASTERN CANADA

Kimball.—Following a series of tests of 1 Payne, recently completed by Imperial Oil, Ltd., on the Roy Booth farm, Lot 21,



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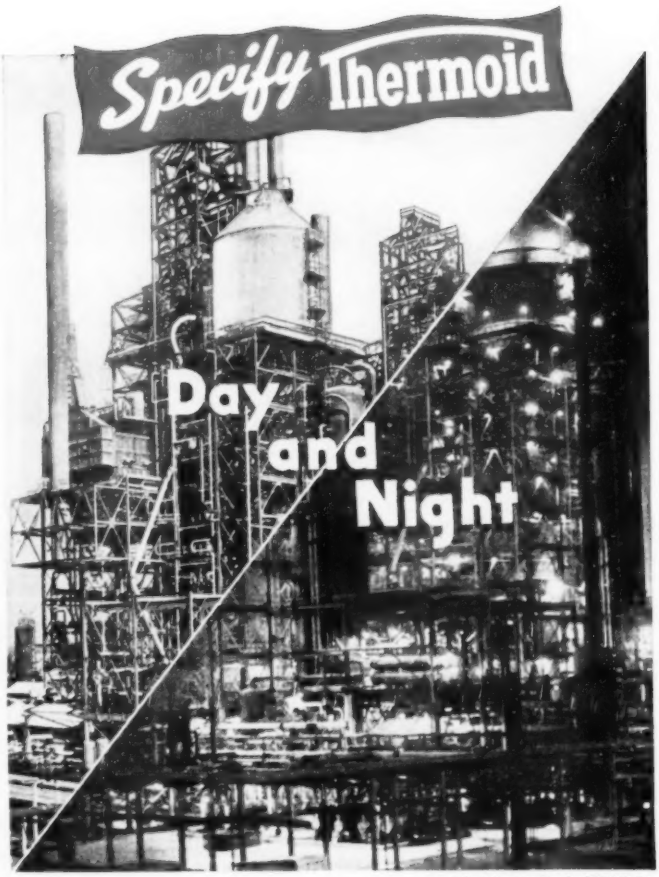

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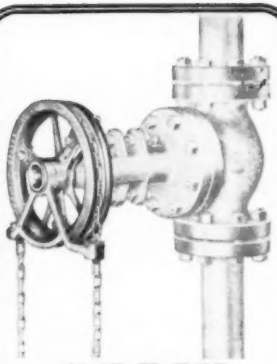

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Concession 7 Moore Township, official announcement has been made that the well has an open-flow potential of at least 40,000,000 cu. ft. making it the largest gasser ever completed in Ontario. Previous record was held by a 30,000,000-ft. gasser drilled at Petrolia in 1900. Actual production of 1 Payne will be held down to around 5,000,000 cu. ft. It is expected that a line recently laid by Union Gas Co. to take production from Kimball field will be extended $1^1/_2$ miles northwest to take gas from the new producer. Imperial is now drilling a well $1^1/_2$ miles from the discovery.

Gaspe.—In the Gaspe Peninsula, Quebec, arrangements have been made for Dowell Incorporated to acidize three wells in which Gaspe Oil Ventures, Ltd., of Montreal is interested. The 1 Continental-Gaspe, on the Galt Brook dome, drilled to 1,380 ft., will acidize at 926-34 ft. where relatively important oil and gas shows were encountered in April. The 3 Venture, on the Galt anticline, will test zones at 2,297$^1/_2$-2,315 ft. and 2,369-85 ft. The 1 Imperial-Gaspe, on the Bald Mountain anticline, in which Imperial Oil, Gaspe Oil Ventures, and Quebec Oil Development Co. are jointly interested, will acidize at 2,600-05 ft. where samples indicated good oil staining with porosity. If it is found possible to progressively acidize four wells simultaneously, 2 C.P.L. on the Terrace structure may also be treated. Each well will be given two or more treatments with progressively increased pressures and acid gallonage, each treatment followed by extensive swabbing. Imperial Oil experts will be in attendance.

PERMIAN BASIN

North Snyder Extension Gets Flush Production

MIDLAND—W. A. Moncrief et al, 1 C. W. Huckabee, Section 160, Block 3, H&GN Survey, discovered flush production $1^1/_2$ miles southeast of the most southeastern portion of North Snyder field in Scurry County. It encountered the Canyon reef, producing horizon of the area, at 6,655 ft., 115 ft. low structurally to the nearest production in the south extension section of the field. A drill-stem test from 6,680-6,800 ft. developed gas at the surface in 5 minutes, mud in 12, and oil in 15. The well flowed at an estimated rate of 100 bbl. of oil hourly for 15 minutes before testing tool was closed. Operators were running casing for completion attempt.

Standard Oil Co. of Texas will test the gap between North Snyder field proper and its south extension area. It will drill the 1 Jap Beck, 600 ft. from the south and west lines of Section 393, Block 97, H&TC Survey. It is 1 mile south of production in the pool and the same distance north of the south extension area.

Forest Oil Corp. and Anderson-Prichard Oil Corp. 1-A Parmer CSL, Labor 12, League 317, Parmer CSL Survey, wildcat 15 miles southeast of Seminole, Gaines County, is to be drilled to 15,000 ft. It will seek the Ellenburger to this depth. It is 19 miles due east of the only Ellenburger production in Gaines County, which is in Flanagan field. Third producer for Flanagan Clear Fork field has been completed at the Magnolia Petroleum Co. 2 Flanagan, Section 9, Block A-23, PSL Survey, north offset to George P. Livermore, Inc., 1 Joe Head, discovery well. It flowed 237 bbl. of 38-gravity oil daily through $^1/_2$-in. choke. Production was through perforations from 7,170-7,222 ft.

Humble Oil & Refining Co. 1 Crabtree, Section 2, Block 26, H&TC Survey, northwestern Mitchell County wildcat 12 miles northwest of Colorado City, was drilling below 7,611 ft. in lime and shale after recovering 15 ft. of drilling mud with no shows on a 30-minute drill-stem test from 7,544-80 ft.

Republic Natural Gas Co. 1 V. J. Powell, Section 44, Block 40, T-4-S, T&P Survey, northern Upton County wildcat 2 miles southeast of Pegasus field, ran a 5-hour drill-stem test from 11,919-12,005 ft. in the Devonian. There was a small amount of gas at the surface in 3 hours and 40 minutes. Recovery was 1,890 ft. of slightly gas-cut water blanket, 630 ft. of muddy, gas-cut water blanket, and 900 ft. of gas-cut and slightly distillate-cut drilling mud. Operator will deepen and test again.

C. L. Norsworthy 1 Mary T. Christian, Section 48, Block 32, T-2-N, T&P Survey, Howard County wildcat, 9 miles northeast of Big Spring, recovered 5 ft. of mud in 20 minutes on a drill-stem test in the Pennsylvanian from 8,042-80 ft. and was drilling ahead.

Magnolia 18-B Cowden, discovery well 2 miles southeast of Dollarhide field, Anderson County, Section 12, Block A-55, PSL Survey, produced 103 bbl. of oil in 15 hours, flowing 30 minutes out of each $1^1/_2$ hour in the Devonian section after installing an intermitter. Casing pressure was 150 psi. Operator was testing.

WEST TEXAS (DISTRICTS 8-7C SUCCESSFUL WILDCATS

Mitchell County: Superior Oil Co. 1 J. R. Dockery, Sec. 17, Blk. 28, T-1-S, T&P Sur., 3 mi. S. Westbrook field, flowed 172 bbl. 42-gravity oil day, perf. 7,979-89 ft., TD 8,004 ft., Ellenburger 7,984 ft., elev. 2,165 ft.

Sterling County: York & Harper, Inc., and J. P. Gibbons 1 L. C. Clark, Sec. 6, Blk. A, R. R. Wade Sur., $1^1/_2$ mi. S extension to Ohio & Placid 1 Clark, 12 mi. NW Water Valley, pumped 14 bbl. of 36-gravity oil day on 2-in., TD 873 ft., San Andres 826 ft., elev. 2,233 ft.

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WEST TEXAS (DISTRICTS 8-7C) WILDCAT FAILURES

Andrews County: Anderson - Prichard Oil Corp. 1-E University, Sec. 7, Blk. 7, Univ. Lds. Sur., 16 mi. E Andrews, dry, TD 5,886 ft., Yates 3,120 ft., San Andres 3,867 ft., elev. 2,994 ft.

Cochran County: Humble 1 F. O. Masten, Lab. 18, Lge. 135, Armstrong CSL Sur., 14 mi. SW Morton, dry, TD 10,788 ft., Glorietta 5,290 ft., Clearfork 5,970 ft., Wolfcamp 8,520 ft., elev. 3,847 ft.

Schleicher County: Southern Minerals Corp. 1 J. F. Webster, Sec. 2, Blk. 8, TW&NG Sur., 25 mi. E Eldorado, dry, TD 5,020 ft., Strawn 4,327 ft., Ellenburger 4,800 ft., elev. 2,309 ft.

Terry County: Union Oil Co. of California 1 N. A. Lindsey, Sec. 11, Blk. C-36, PSL Sur., 3 mi. NW Adair field, dry, TD 3,135 ft., San Andres 4,640 ft., elev. 3,267 ft.

SOUTHEASTERN NEW MEXICO

HOBBS—Stanolind Oil & Gas Co. 1 Federal-Leonard, 11-26s-37e, extreme southeastern Lea County wildcat, reacidized the section from 9,410-9,530 ft. with 2,500 gal. and yielded 105 bbl. of load oil and acid water and 10 bbl. of new oil before being swabbed dry. Shut in 12 hours, fluid level rose to 4,000 ft. from bottom and swabbing was resumed, with recovery of 11 bbl. of oil and 3 bbl. of acid water the next 12 hours. The section had previously been washed with 500 gal. of acid.

Humble Oil & Refining Co. 1-X State, 31-11s-35e, wildcat 8 miles northwest of Tatum, recovered 4,125 ft. of water blanket plus 15 ft. of slightly gas-cut drilling mud on a drill-stem test from 12,959-77 ft. Total depth is 13,100 ft. in the Devonian.

Mid-Continent Petroleum Corp. 1-65 State, 1-12s-33e, wildcat 11½ miles northeast of Caprock, on a 35-minute drill-stem of the Wolfcamp through perforations from 8,540-8,633 ft. recovered 1,800 ft. water blanket and 25 ft. of drilling mud with no shows. It was drilling below 8,710 ft.

McAlester Fuel Co. 1 J. M. Denton, 11-15s-37e, wildcat 14 miles northeast of Lovington, had gas to the surface in 4 minutes on a 3-hour drill-stem from 10,537-93 ft. and recovered 100 ft. of gas-cut mud. Test was in the Mississippian topped at 10,449 ft.

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TEXAS GULF COAST

Francitas Field May Be Extended to Southeast

HOUSTON—Houston Oil Co. of Texas 1-A Trull promises to extend Francitas field southeast. On drill-stem test at 7,951-61 ft. the well recovered 1,150 ft. of oil and 120 ft. of water. The well also tested oil in the 7,950-ft. zone. Operators are now drilling below 9,000 ft.

One of the deepest wells in South Texas, Plymouth Oil Co. 1 Archbishop of San Antonio, blew out while casing was being pulled. The well was drilled to 12,542 ft. with 5½-in. casing set at 5,500 ft. It made a sweet gas with slight show of oil and fresh water. Well is located in the H&GN Survey, 9 miles south of Los Angeles, in Lavaca County.

R. J. Caraway and Atlantic Royalty Corp. 2 Weinheimer, in the William Vess League, Abstract 349, Wharton County, cut a fault at 4,642 ft., which is 11 ft. higher than the 1 Weinheimer, gas discovery. Electric log was run at 5,001 ft. which showed a good sand at 4,956-66 ft. in the upper Frio. Well is now core-barrel drilling at 5,060 ft. and operators are looking for a break to start coring again.

Sun Oil Co. is preparing to test the 1 State Tract 231, in Galveston Bay. Hole is bottomed at 11,990 ft. and operators expect to perforate the section at 10,880-10,900 ft.

Four new locations in the new Prasifka field, Wharton County, have been staked, two by H. C. Cockburn and two by C. C. Gilger.

The 37 new locations on the Texas Gulf Coast include 7 wildcat starts, 1 each in Matagorda, San Jacinto, Austin, Bee, Calhoun, Karnes, and Refugio counties. There was one successful exploratory test completed in San Jacinto County, while six were dry, one each in Chambers and Wilson counties and two each in Brazoria and Matagorda counties.

TEXAS GULF COAST (DISTRICTS 2 & 3) SUCCESSFUL WILDCAT

San Jacinto County: Butcher-Arthur A-3 Coline Oil Corp., James Rankin Sur. A-40, 5 mi. SW Cold Springs, top sand 4,382 ft., TD 4,531 ft., perf. 4,384-88 ft., IP: 66 bbl. oil per day, 6/64-in. choke, TP 620 psi., 42.3° gravity.

TEXAS GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES

Brazoria County: Dan J. Harrison, Jr., 1 Belle H. Widson Est., SW flank of Nash Dome, dry, TD 5,814 ft.

Production Service Oil Corp. & J. S. Abercrombie 1 A. F. Mitchell, M. V. O'Donnell Sur. A-482, dry, TD 7,026 ft.

Chambers County: Hinkle Drilling Co. 2 Paul Sherman, James McFadden Sur., A-17, 3 mi. N of Wallisville, dry, TD 8,160 ft.

Matagorda County: E. Cockrell, Jr., 1 A. L. Craig et al, Thomas Williams Sur., 1 mi. NW Cedar Lake, dry, TD 6,140 ft.

J. M. Huber Corp. 1 Petrucha, F. M. Dempsey Sur., A-26, 3 mi. SW of Wadsworth, dry, TD 4,505 ft.

Wilson County: Wise Drilling Co. 1 Ed Kolodziej, in David J. Holt Sur., A-131, 5½ mi. E-NE of Poth, dry, TD 4,288 ft.

ILLINOIS

Orchardville Area Adds Two New Good Producers

MATTOON.—The new area north of Orchardville in Wayne County has taken on new importance with the completion by Magnolia Petroleum Co. of a 2,800-bbl producer in its 1 Burgess, NW SE SW 9-1n-5e. Located south of the discovery well, flowed 2,807 bbl. natural in the first 24 hours, and increased its output to 2,863 bbl. in the second 24 hours. Pay is the McClosky lime at 2,980-87 ft.

At the same time, Russell P. Johnson 1 Edward Vest, NE NW SW 16-1n-5e, about a mile south of the Magnolia well, flowed 442 bbl. in the first 12 hours, and, after acidizing with 2,000 gal., increased its flow to 65 bbl. per hour as a second good well. Testing continues. Eight other tests now are drilling in the area, making this one of the most active spots in the state.

Another prospective pool is in the making in Edgar County, north of the town of Ferrell, where National Associated Oil Co. and Continental Oil Co. have cemented 5½-in. casing at 2,091 ft. to test good showings found in the Devonian, topped at 1,941 ft. to test good showings found in the Devonian, topped at 1,941 ft. Total depth is 2,093 ft. A drill-stem test, taking in an interval at 1,962-73 ft., resulted in a recovery of 240 ft. of clean oil and 5 ft. of mud-cut oil. Another test was made of an interval at 1,947-69 ft., in which a good show of gas was obtained and 155 ft. of muddy oil recovered. A third test was made at 1,971-81 ft., but yielded sulfur water.

East of the Herald pool in White County, C. E. Brehm is testing oil showings encountered at 2,655-80 ft. in Cypress sand in his 1 Dagley, NE SW NE 2-7s-9e, and may open a new area for development. Sand was shot with 60 qt.

ILLINOIS SUCCESSFUL WILDCATS

Bond County: Hoiles Petroleum Co. 1 White, SW SW SW 13-4n-3w, IP 3 bbl., Benoist 1,106-10 ft., TD 1,126 ft. (New pool).

Gallatin County: J. L. Crawford 1 Sutton, SW SW NE 6-8s-10e, IP 18 bbl., Tar Springs 2,123-31 ft., TD 2,496 ft. (New pool).

Franklin County: Paul Moseback 1 Bays, SE NE SW 35-5s-1e, IP 35 bbl., Devonian 4,351-4,435 ft., TD 4,500 ft. (New horizon Sesser pool).

ILLINOIS WILDCAT FAILURES

Clinton County: F. L. Goldsmith 1 Krebs, NE NE SW 24-2n-3w, dry, TD 1,291 ft.

Edgar County: M. M. Steckler and Hurst 1 Querry, NE SW NE 14-14n-13w, dry, TD 550 ft.

G. A. Oexner 1 McDaniel, SE SE NE 2-13n-13w, dry, TD 470 ft.

Gallatin County: C. T. Smith et al 1-A Hale, NE NE NE 21-7s-9e, dry, TD 2,334 ft.

George & Wrather and Aurora Gasoline Co. 1 Murphy, SE SW SW 28-7s-9e, dry, TD 2,756 ft.

Hamilton County: Sun Oil Co. 1 Evans, NE NE SE 1-4s-6e, dry, TD 3,475 ft.

Macon County: S. E. Breeze 1 Phillips, NW SW NE 21-17n-3w, dry, TD 2,234 ft.

Wabash County: C. E. Skiles 1-A Brian, SE SE NE 12-2s-14w, dry, TD 2,925 ft.

Washington County: Columbus Exploration Co. 1 Rosener, SW SW NE 36-2s-4w, dry, TD 1,495 ft.

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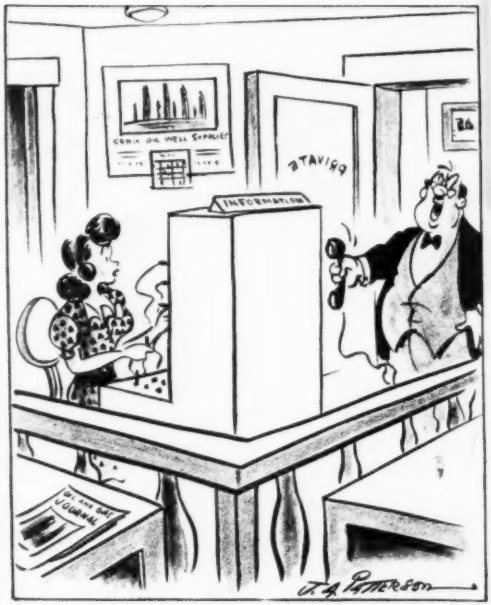

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OHIO, KENTUCKY

Milligan Pool Extended West by One Location

COLUMBUS—Roy Weed et al 1 Elizabeth Le Roy, Section 33, Harrison Township, Perry County, extends the Milligan pool to the west by one location. Clinton sand at 3,662-3,708 ft. flowed 47 bbl. in 24 hours after shot.

Another good well was added to the Baker pool in Hopewell Township, Perry County. The Mid East Oil 6 J. R. Underwood, Section 34, logged the Clinton at 2,870-2,907 ft. with 12 bbl. natural and 125 bbl. in 24 hours after a 120-qt. shot.

Frank Brendel et al 1 Lawrence Dove, Section 7, Jackson Township, Muskingum County, their second well in the Perryton extension, made 85 bbl. in 24 hours after shot. The Clinton sand was reported at 3,090-3,151 ft. Brendell and Allen Willey each have wells drilling on offset locations.

Sentinent Enterprise 1 Mack, Section 3, Oxford Township, Erie County, a wildcat, found a showing of about 3 bbl. in the top of the Trenton at 2,422-27 ft. Drilling was continued to 2,965 ft. without finding anything further and the well will be plugged back to shoot and test the oil showing.

New locations continue at good rate, although mostly for shallow wells, with 24 from 15 counties. Ashland having 4 and Wayne 3. Of the 20 wells completed for the week, Cambridge and Ashland fields each had 4.

OHIO WILDCAT FAILURE

Tuscarawas County: Clay Township: H. D. Bowman et al 1 Aldo Bau, Sec. 11, Berea 1,265-1,355 ft., TD 1,390 ft.

EASTERN KENTUCKY

ASHLAND—Revived interest is again being shown in the old and now abandoned pools of southern Bath County where in years past production was had from sediments of Upper Ordovician age. Latest test is that of R. B. Tamlyn 1 Pipenbrink on McCarthy Branch, a short distance east of the town of Olympia. Well is now spudding and pay zone expected at about 250 ft.

In western Lewis County, 4-Y-72, H. P. Purnell et al 1 C. F. Ferguson is drilling at 875 ft. on its way to test part of the Upper Knox dolomite series.

Another small producer has been added to the Station Camp pool of south central Estill County. On the old Congleton lease south of the town of South Irvine, W. E. Lucson has completed a producer at 385 ft. for 10 bbl. of oil per day plus some water. More wells may be drilled in the near future.

EASTERN KENTUCKY WILDCAT FAILURE

Menifee County: A. H. Carpenter 4 Shelby Palmer, Middle Fork of Indian Creek, dry, TD 521 ft., Devonian brown shale 341 ft., Corniferous lime 513 ft., water.

WESTERN KENTUCKY

OWENSBORO—The area northwest of the Robinsonville pool in eastern Union County where two wildcats less than 2 miles apart are showing for good production is receiving chief attention of western Kentucky operators. With a common pay zone at approximately the same depth, it is possible the production of both wells may be linked to prove a single fairly large pool.

One of the wells, I. W. Hartman and associates 1 Culver heirs, 11-P-20, $1\frac{1}{2}$ miles northwest of Robinsonville production, which last week was reported to have made favorable drill-stem tests in Cypress sand at 2,300-12 ft. and O'Hara lime at 2,513-21 ft. and 2,527-36 ft., has been deepened to 2,675 ft., encountering additional good saturation in the McClosky lime at 2,558-62 ft., 2,585-88 ft., 2,607-12 ft. and 2,668-73 ft. At latest report, it had drilled out plug and was cleaning out preparatory to starting production tests of the various zones.

In the meantime, Delta Drilling Co. 1 Walker heirs, NW SE NE 13-P-20, less than 2 miles to the west, encountered good saturation in the O'Hara lime at 2,512-23 ft., and, with total depth at 2,526 ft., has cemented $5\frac{1}{2}$-in. casing at 2,508 ft. to complete. In a drill-stem test of the zone, gas showed in 4 minutes and oil started flowing in 36 minutes. Considering surface elevations (355 ft. in the Delta well and 349 ft. at the Hartman location), the O'Hara is 7 ft. higher in this well than the former.

Wasson Oil Co. 1 Goodwin, 17-N-28, Daviess County, which opens a new area between the East Guffie and Genville pools, and is 2 miles from nearest production of either, has been completed pumping 115 bbl. per day. Previously it had swabbed and flowed at the rate of 314 bbl. per day. Pay zone is the McClosky at 1,891-$94\frac{1}{2}$ ft.

George Engle and J. E. McCauley 1 Greathouse, SW cor. 23-Q-20, east offset to the discovery well and first confirmation well for the new area opened $2\frac{1}{2}$ miles southeast of the Powells Lake pool, Union County, swabbed 10 bbl. an hour natural in initial production tests of the Cypress sand at 2,234-41 ft. The discovery well, Ryan Oil Co. and associates 1 Charles Greathouse, SE cor. 24-Q-20, continues to pump at the rate of approximately 150 bbl. per day from sand at 2,243-51 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCATS

Daviess County: Wasson Oil Co. 1 Goodman, NW SE NE 17-N-28, IP 118 bbl., McClosky 1,892-95 ft., TD 1,985 ft. (Extension Glenville pool).

Union County: Ryan Oil Co. et al 1 C. R

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Greathouse, SE SE SE 24-Q-20, IP 132 bbl., Cypress 2,236-44 ft., TD 2,252 ft. (New pool).

WESTERN KENTUCKY WILDCAT FAILURE

Union County: Basin Drilling Co. and J. C. Ellis, NW SW NE 21-O-18, dry, TD 2,719 ft.

INDIANA

EVANSVILLE—George & Wrather Drilling Co., Aurora Gasoline Co., and Barclay Oil Co. 1 Leslie Tenison, SW SE NW 2-7s-12w, new pool opener in Posey County, has been completed as a 20-bbl. pumper in Hardinsburg sand at 2,070-77 ft., on which casing was cemented at 2,069 ft. The well also had showings in the Waltersburg at 1,840-48 ft., but yielded only water in initial production tests of that zone, in which casing was perforated. It is 1½ miles east of the LaMott pool and 6 miles southeast of Mt. Vernon.

Adjoining a small gas producing area 5 miles west of the Dodge Bridge pool in Sullivan County, A. J. Slagter has made a 22-bbl. oil pumper in his 1-A Kelley, NW NE SE 11-8n-11w. Pay zone is a shallow Pennsylvanian sand at 580-606 ft.

Several other scattered wildcats were testing over the weekend and giving indications of opening additional new small production although no gages were available. A. J. Slagter 1 McKee, SE NE NW 16-6n-6w, in the old Lyons gas area, Greene County, was testing oil showing in Devonian at 1,677-1,840 ft. The same operator's 1 Bland, NE NE SW 9-5n-10w, several miles west of the Oaktown pool, Knox County, had acidized and was testing Devonian at 2,893-95 ft. Others included James A. Boland 1 Boyle, NW NW SE 34-4s-10w, southwest of the Stacer pool, Vanderburgh County, testing O'Hara at 2,245-50 ft.; Spear Oil Co. 1 Martin, SW SE SW 11-1n-8w, northwest of the new Arda pool, Knox County, testing Aux Vases at 1,262-92 ft.; and Charles Clark 1 Sugg heirs, SW SE SE 21-6s-14w, between the Wellborn and Grafton pools, Posey County, testing Cypress sand at 2,516 ft.

INDIANA SUCCESSFUL WILDCATS

Knox County: J. B. & L. Drilling Co. 1 Scott, C SE NE 19-2n-8w, IP 12 bbl., McClosky 1,571-77 ft., TD 1,652 ft. (New pool).

Winmar Oil Co. 1 Parkinson, NE NE NW 11-1s-12w, IP 120 bbl., Lower O'Hara 2,226-65 ft., TD 2,269 ft. (Discovery well Cypress Pond pool).

Posey County: George & Wrather and Aurora Gasoline Co. 1 Tennison, SW SE NW 20-7s-12w, IP 28 bbl., Hardinsburg 2,069-77 ft., TD 2,077 ft. (Discovery well Crunk South pool).

Vigo County: Gilliam Drilling Co. 1 Huntwork, NW NW SE 20-10n-8w, IP 100 bbl., Devonian 1,847-49 ft., 1,885-60 ft., 1,865-79 ft., TD 1,984 ft. Discovery well Blackhawk pool).

APPALACHIAN FIELD

Corniferous Lime Found By Several Drilling Wells

PITTSBURGH.—In wildcat drilling in West Virginia, Reno district, Preston County, Snee & Eberly 1 Dola E. Dever, elevation 1,508 ft., logged the Onondaga chert at 5,169 ft. and drilling is in this formation. In the vicinity of the Waterbury discovery well, Grant district, Jackson County, United Carbon Co. et al 1-16622 L. C. Sheppard, elevation 856 ft., reached the Corniferous lime at 4,905 ft. and 5½-in. casing is being set at 4,916 ft. In this same section, but in Steele district, Wood County, Godfrey L. Cabot, Inc., 1300 Benjamin Quick, elevation 997 ft., topped the Corniferous lime at 4,949 ft., and is drilling at 4,981 ft.; United Carbon Co. et al 1-1633 P. E. Province, elevation 1,011 ft., ran 7-in. casing and is drilling in the Corniferous lime at 4,985 ft. which was topped at 4,974 ft. Another wildcat, United Fuel Gas Co. 1-5478 A. W. Hicks, elevation 2,834 ft., in Beaver Pond district, Mercer County, reached a depth of 4,014 ft. and shut down. Weir sand at 3,174-3,267 ft., gas 3,183-87 ft. testing 26,000 cu. ft., and will be shot in this pay. A good shallow-sand gas well was reported in Grant district, Nicholas County, Columbian Carbon Co. 1-1129 Hattie Summers, 2,524,000 cu. ft. of gas, Big lime, total depth 1,859 ft.

New locations reported in West Virginia were seven: Pleasant district, Clay County; Southwest district, Doddridge County; DeKalb district, Gilmer County; and Ripley district, Jackson County.

In Derry Township, Westmoreland County, Pennsylvania, Peoples Natural Gas Co. 4-3814 Camilla Giffen, elevation 2,238 ft., has resumed drilling and is at a depth of 8,679 ft. Napier Township, Bedford County, South Penn et al-Snee & Eberly 1 Jesse B. Miller, elevation 1,666 ft., is drilling at 3,648 ft. Georges Township, Fayette County, Orville Eberly et al 1 N. E. Murphy is rigging up to drill. A good shallow-sand gas well was reported in Amwell Township, Washington County, Manufacturers Light & Heat Co. 1 Joseph Gray heirs, deepened from 1,213 ft. and encountered gas gaging 1,200,000 cu. ft. in the Bayard sand, total depth 3,176 ft.

New locations reported in southwest Pennsylvania were four: Kiskiminetas and Mahoning townships, Armstrong County; Piney Township, Clarion County; and Bell Township, Westmoreland County.

Watching Washington

(Continued from page 92)

joining with the Republicans to toss Chairman Pat McCarran of the Judiciary committee overboard by a petition to take from his committee the displaced-persons legislation which the Republicans are trying to force on to the floor for action.

But Lucas, in an unprecedented appearance at a strictly G.O.P. caucus told the Republicans that action on the displaced-persons bill would have to come after everything on the administration's must program was disposed of. That program includes minimum wage, reciprocal trade, appropriations, and several other bills.

Lucas said he was willing to go along with the Republicans on the displaced-persons bill because it was a "humanitarian" and not a partisan measure, but some of the more skeptical members saw in his action a move to get a little Republican support for driving through administration legislation which is stalled and likely to remain so.

On the brighter side, if the session is stretched out for a couple of months more there will be a better chance of getting action this session on tidelands legislation, for which little hope is seen if Congress adjourns in the next 3 or 4 weeks, as originally planned.

Treaties to Protect Oil Investments Urged

(Continued from page 84)

pensating those whose property is expropriated must be provided if the underdeveloped countries are to obtain the capital which is required for their development."

The State Department is "constantly working" on the problem, particularly through the negotiation of treaties, it was testified by Under Secretary James E. Webb, who explained that these treaties "are designed to assure the potential investor that his property will not be expropriated without prompt, adequate, and effective compensation; that he will be given reasonable opportunity to remit earnings and withdraw his capital; that he will have reasonable freedom to operate, manage, and control his enterprise; and that he will enjoy security in the protection of his person and property and nondiscriminatory treatment in the conduct of his business affairs."

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However, Webb added, abnormal deterrents to private investment abroad cannot be removed by investment treaties alone, and although, for example, a treaty may assure no discrimination against United States investors seeking to remit profits, it cannot assure that sufficient dollars for that purpose will actually be obtainable, and the pending legislation is designed to safeguard investors against this and other risks.

The Point Four program, Webb said, puts particular emphasis upon the flow of private investment because United States private capital "is potentially the major external source of investment capital for development abroad and because it can contribute not only funds but also the technical skills, managerial experience, and organizational talents that are essential to put capital to effective use.

Humble Accepts Bids on Field Research Station

HOUSTON.—Bids have been received by Humble Oil & Refining Co. for a new two-story geophysical research field station to be built adjoining the company's Friendswood field south of Houston.

The building will provide facilities for field testing of various projects developed in the company's Houston research department. It will be of brick construction and will contain a radar laboratory on the second floor.

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Move to Require Competitive Bids Rouses Independents' Ire

WASHINGTON.—An Interior Department proposal to require competitive bidding for all leases for oil or gas development of acquired lands was vigorously resisted this week by independent producers appearing before a House public lands subcommittee headed by Rep. Clair Engle of California.

They had as their target revamped proposals offered last week by the Interior Department. *(See The Oil and Gas Journal, August 11, page 143).*

The present situation arose out of an effort by Rep. A. Leonard Allen of Louisiana to have all leases on acquired lands in the Kisatchie National Forest in that state put on a competitive basis. Allen explained that under present law the federal lands are being leased for $1 an acre for 5 years while privately owned and state lands are bringing bonuses of as much as $25 an acre.

Members of the committee said the issue now has become so involved it is doubtful whether any legislation can be enacted this year, and Engle sought to clarify the situation by suggesting the bill might be limited to Louisiana and Mississippi, where conditions are different from those in western states from which most of the opposition is coming. Engle pointed out that competitive leasing has a "historical" basis in the two states because it was put into effect by the Department of Agriculture, which handled the oil and gas development before it was turned over to the Interior Department.

Many Oppose Bill

A number of independent operators from all sections of the country expressed opposition to the legislation this week, declaring it would make it practically impossible for an independent to get any of the government acreage in competition with the major companies.

It was pointed out by Leland Richardson of Baton Rouge, representing a number of operators, that the purpose of the law transferring the leasing of the acquired lands from Agriculture to Interior was to bring about uniformity in procedure. A policy which would be reversed by the pending legislation.

More than 88 per cent of the leases made by the Louisiana lessees go to the major companies but the independents do the wildcatting. From the standpoint of the Government, he said, the bonuses and rentals are insignificant compared with the importance of development and the consequent royalties.

Delay in the issuance of leases by the Interior Department has materially restricted development of the acquired lands, the subcommittee was told by I. E. Larue of Jackson, Miss. It takes more than 2 years for a lease to come through, he said, and at the rate they are being issued it will be 1965 before the 1,700 applications pending are disposed of.

"The law is now on the books," Larue declared, "and the department should properly administer it and issuance of leases should not be held up waiting for the law to be changed."

FPC Approves 4,900 Miles During First Half

FEDERAL POWER COMMISSION authorizations for the construction of 4,900 miles of pipe lines to cost an estimated $374,820,900 were issued during the first half of 1949.

In a semiannual report of FPC activities, Chairman Nelson Lee Smith said the permits issued will, if used, add about 2 billion cubic feet to the nation's present daily delivery capacity.

Of the 4,900-mile total, 4,641 miles would be laid in major projects. A major project is one costing more than $700,000.

Largest project approved during the period is that of Trunkline Gas Supply Co. from Texas to Nebraska. The project involves 1,521 miles of line and seven compressor stations with an aggregate cost of $84,340,300.

During the whole fiscal year ending June 30, FPC authorized construction of 7,045 miles of lines and compressor units totaling 518,100 hp. at a total cost of $566,203,100.

Of this total major projects would take 6,420 miles of line and 505,300 hp. in compressor units.

Plans Being Readied for N.P.A.'s Annual Meeting

Plans for the forty-seventh annual meeting of National Petroleum Association are being prepared and Fayette B. Dow, general counsel, reported that it will be one of the "best in the association's history." The group meets in Atlantic City September 14-16 at the Traymore Hotel.

General sessions, to be held on Wednesday and Thursday afternoons, will feature talks on the relations between the petroleum industry and the public, and the Government and the industry.

Among the speakers who will participate in the program are Conger Reynolds, Standard Oil Co. (Ind.), chairman of the Oil Industry Information Committee, who will discuss the oil industry's public-relations program and the work of the committee; Alexander Fraser, president, Shell Union Oil Corp., who will discuss impacts of traffic congestion in the oil business; Robert E. Freer, former member of Federal Trade Commission, who will speak on geographical pricing, the basing-point problem, and implications of the Detroit oil-jobber case; and Charles M. Brooks, formerly associate general counsel of National Labor Relations Board and now labor-relations attorney for The Texas Co., who will talk on the Government and labor relations.

Small Refiner Relief Bill Gets Tentative Senate O.K.

WASHINGTON.—The Senate last week accepted House amendments to a bill eliminating the payment of premiums by independent refiners purchasing government royalty oil under the O'Mahoney Act of July 13, 1946, but demurred to a House provision opening lands in the Shasta National Forest, California, to mineral development on the ground that it had no relation to the primary subject of the legislation.

The bill, which was sent back to the House for further action, would relieve independent refiners who contracted for royalty oil in 1947 from payment of the premiums which they offered when bidding for the crude under the O'Mahoney Act, which gave them first call on the royalty oil.

Under the legislation, no further premiums would be collected by the Interior Department and premiums already paid would be credited to the refiners' accounts. The contracting refiners would be given the option of continuing to take the oil at the posted price or of surrendering their contracts, but relief would not be granted on any contract which has been transferred to the ownership or control of a refinery ineligible for O'Mahoney Act preference.

Louisiana Drilling Permits Reach 1,370 This Year

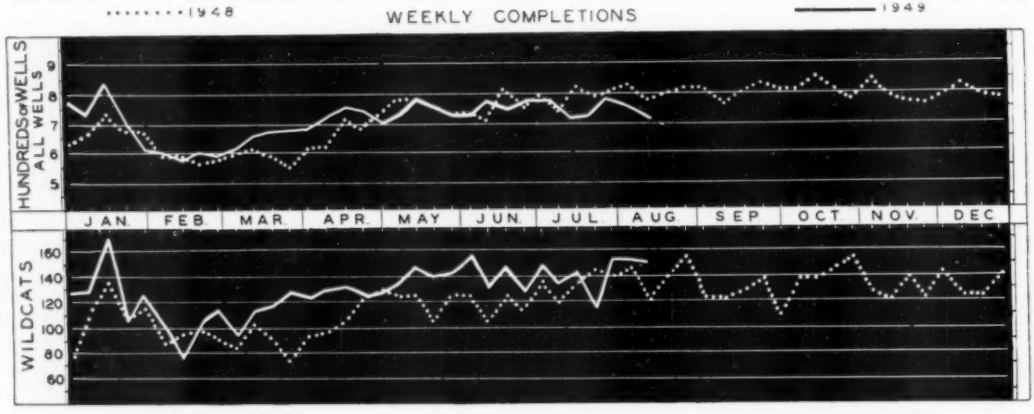
BATON ROUGE.—Louisiana issued 257 drilling permits in July, 27 of them for wildcat wells, bringing the total for the year to 1,370, state Conservation Commissioner S. L. Digby has announced.

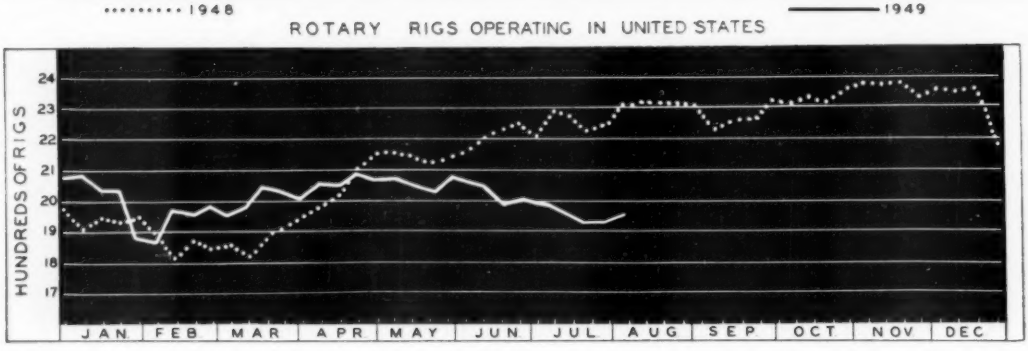
At the end of the month, Digby said, there were 259 rigs running in the state, in the following districts: Houma 51, Lafayette 43, Lake Charles 26, New Orleans 35, Monroe 43, Shreveport 61.

WEEKLY WELL COMPLETIONS . . WEEK ENDED AUGUST 13, 1949

	Total of all wells					32 wk		Wildcat completions and discoveries					Cumulative total, 1949				
	Comp.	Oil	Gas	Dry	Footage	1949	1948	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	11	5	0	*6	12,807	635	921	0	0	0	0	0	0	0	0	0	0
Pennsylvania	19	7	4	*8	40,173	924	1,577	0	0	0	0	0	0	0	3	1	4
West Virginia	13	1	7	5	31,838	295	480	0	0	0	0	0	1	0	7	7	15
Ohio	20	6	6	*8	45,102	640	819	0	0	0	1	1	1	0	2	22	25
Indiana	31	18	0	13	54,193	773	623	4	0	0	0	4	19	0	0	141	160
Kentucky	21	8	4	9	38,828	538	412	2	0	0	2	4	17	0	0	43	60
Illinois	63	30	0	33	141,022	1,516	1,354	3	0	0	9	12	38	0	1	253	292
Michigan	18	10	0	§8	38,711	590	474	1	0	0	5	6	20	0	1	180	201
Kansas	64	31	12	21	209,107	1,909	1,828	6	0	1	11	18	42	0	5	243	290
Neb., Mo., Iowa	1	0	0	1	4,615	16	3	0	0	0	1	1	1	0	0	11	12
Oklahoma	105	58	5	42	342,726	2,608	2,445	6	1	0	18	25	93	11	10	382	496
Texas	222	152	6	64	885,339	8,127	7,032	12	0	0	30	42	259	33	78	1,399	1,769
North Central (Dist. 7-B & 9)	92	60	0	32	261,014	2,707	2,187	7	0	0	12	19	117	0	11	553	681
West (Dist. 7-C & 8)	46	38	1	7	224,404	1,941	1,916	2	0	0	4	6	36	0	3	161	200
Panhandle (Dist. 10)	11	11	0	0	33,710	616	363	0	0	0	0	0	1	0	0	3	4
Eastern (Dist. 5, 6, & 6-P)	14	6	2	6	74,121	405	322	0	0	0	3	3	7	2	3	86	98
Gulf Coast (Dist. 2 & 3)	33	20	2	11	170,963	1,222	1,119	1	0	0	6	7	54	25	34	239	352
Southwest (Dist. 1 & 4)	26	17	1	8	121,127	1,236	1,125	2	0	0	5	7	44	6	27	357	434
Louisiana	42	28	4	10	176,267	1,321	1,329	1	0	0	3	4	37	12	4	128	181
Northern	30	19	4	*7	71,481	736	878	0	0	0	2	2	3	2	0	56	61
Southern	12	9	0	3	104,786	585	451	1	0	0	1	2	34	10	4	72	120
Arkansas	9	4	0	5	37,090	191	166	0	0	0	3	3	3	0	0	39	42
Mississippi	4	2	0	2	25,565	208	239	0	0	0	2	2	4	0	1	62	67
Southeastern States	0	0	0	0	0	31	31	0	0	0	0	0	1	0	0	27	28
Montana	20	12	2	6	36,681	153	156	1	0	0	0	1	3	0	2	20	25
Wyoming	8	5	0	3	39,211	362	290	1	0	0	0	1	17	0	0	65	82
Colorado-Utah	1	0	0	1	5,896	85	148	0	0	0	1	1	2	0	0	33	35
New Mexico	5	5	0	0	26,531	311	372	0	0	0	0	0	9	0	1	30	40
California	36	29	0	7	177,229	1,609	1,738	0	0	0	6	6	26	0	6	272	304
Total United States	713	411	50	252	2,370,931	22,842	22,437	37	1	1	92	131	593	56	121	3,358	4,128
Total previous week	752	396	62	294	2,836,054	22,129	21,667	22	3	8	120	153	556	55	120	3,266	3,997
Total August 14, 1948	770	431	54	285	2,701,733			10	3	4	103	120	525	47	162	2,952	3,686

Service well included: *6, *7, *1, §3, *2.





DAILY AVERAGE PRODUCTION FOR WEEK

	Aug. 13 crude oil	B. of M. Aug. demand	Aug. 6 crude oil
Alabama	1,250	1,350	1,250
Arkansas	73,250	88,000	72,830
California	898,900	928,000	900,300
Colorado	65,800	66,000	65,000
Eastern	59,000	60,850	59,850
Florida	1,425	1,400	1,275
Illinois	178,900	176,000	184,400
Indiana	26,700	26,000	29,000
Kansas	267,600	302,000	225,100
Kentucky	22,500	21,000	24,000
Louisiana	483,050	520,000	474,590
North Louisiana	113,750		105,290
South Louisiana	369,300		369,300
Michigan	42,800	46,000	48,100
Mississippi	93,550	109,000	96,150
Montana	26,700	24,000	26,750
Nebraska	600	700	550
New Mexico	125,125	131,000	125,125
Oklahoma	376,450	410,000	378,000
Texas	1,838,200	2,150,000	1,838,200
Dist. 1 (Southwest)	25,740		25,740
Dist. 2 (Southwest)	112,000		112,000
Dist. 4 (Southwest)	177,600		177,600
Dist. 3 (Gulf Coast)	338,860		338,860
Dist. 5 (Eastern)	32,100		32,100
Dist. 6 (Eastern)	79,000		79,000
East Texas field	222,400		222,400
Dist. 7-C (West)	42,300		42,300
Dist. 8 (West)	519,100		519,100
Dist. 7-B (W. Central)	57,600		57,600
Dist. 9 (N. Central)	137,300		137,300
Dist. 10 (Panhandle)	94,200		94,200
Utah	1,050	700	1,050
Wyoming	130,000	118,000	127,000
Total United States	*4,712,850	5,180,000	4,678,520
Change from previous week, up 34,330			
Canada	57,315		60,900

Total U. S. production January 1-August 13 (1,147,722,685 bbl.
Same period last year (crude plus cond.) 1,237,383,325 bbl.

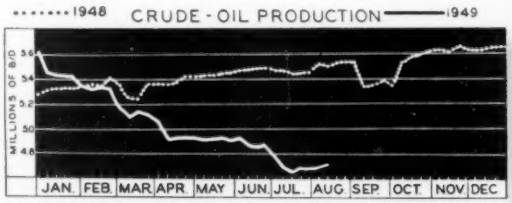
*Not including 80,185 bbl. condensate. (Including 18,613,360 bbl. condensate.

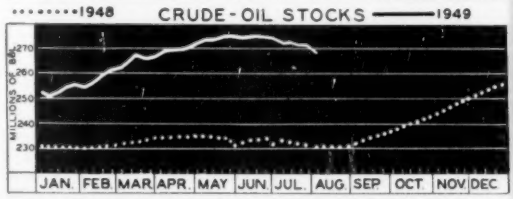
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

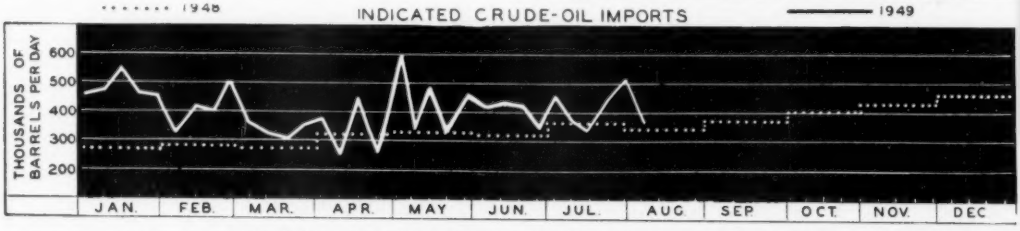
(Thousands of barrels)

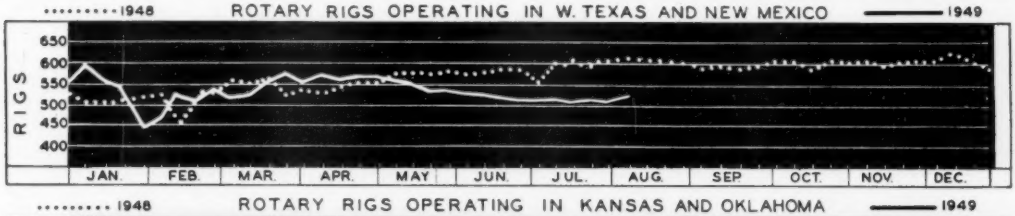
State of origin—	Aug. 6, 1949	July 30, 1949	Aug. 7, 1948
Pennsylvania Grade	3,303	3,257	2,820
Other Appalachian	2,225	2,008	1,108
Ill., Ind., Mich.	14,548	15,263	11,466
Arkansas	2,914	2,984	2,628
Louisiana	15,132	14,980	11,061
North	3,671	3,703	2,904
Gulf	11,511	11,277	8,157
Mississippi	3,092	3,168	2,725
New Mexico	7,474	7,530	5,741
Oklahoma and Kansas	39,042	39,350	33,434
Texas	122,465	125,584	111,045
East Texas	16,295	16,659	15,911
West Texas	49,105	50,372	42,307
Texas Gulf	28,895	29,418	27,712
Other Texas	28,170	29,135	25,115
Rocky Mountain	14,110	14,197	9,361
California	35,733	35,470	30,677
Foreign	7,626	8,208	5,777
Total United States	267,714	271,999	227,843

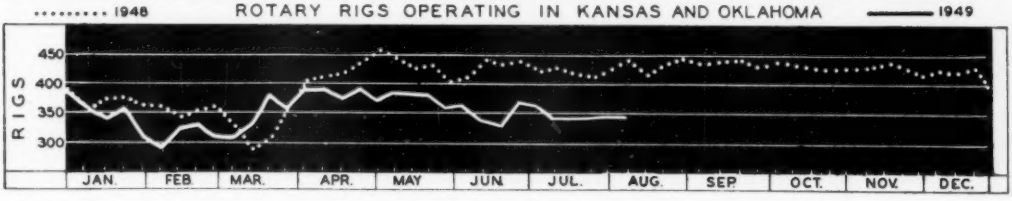
*Bureau of Mines











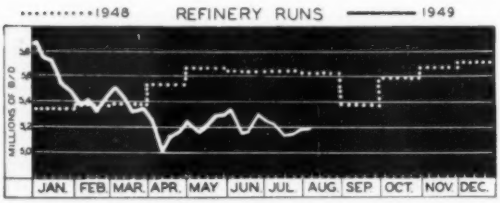
Refining Statistics

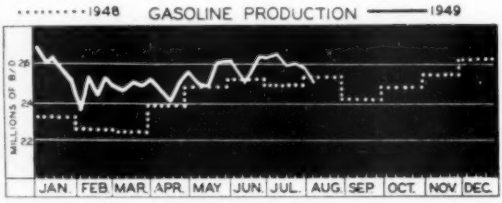
A.P.I. REFINERY REPORT, AUGUST 6

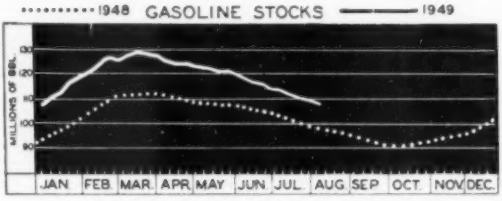
(Thousands of barrels)

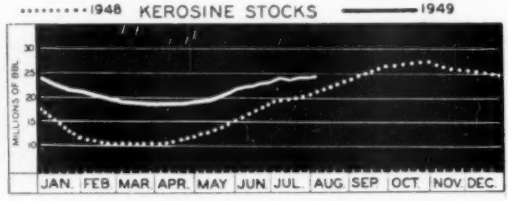
District	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, August 1948				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	755	307.1	22.3	153.1	172.1	25,053	10,286	22,284	10,319	868	326.6	41.4	177.9	215.0
Appalachian:														
District 1	67	35.0	1.6	9.7	9.4	2,376	419	687	533	95	42.2	3.7	10.9	9.8
District 2	65	32.6	2.1	5.9	10.9	1,152	149	255	285	28	12.5	1.2	4.7	9.5
Ind., Ill., Ky.	894	499.7	45.7	130.0	124.4	23,628	4,826	11,528	4,984	914	477.9	49.7	139.2	155.2
Okla., Kans., Mo.	408	237.0	21.9	87.0	54.3	9,594	1,633	5,790	2,231	486	245.6	19.3	95.3	76.5
Inland Texas	216	147.7	12.0	19.1	50.0	3,921	737	931	1,419	245	148.2	11.3	26.3	62.1
Texas Gulf Coast	1,260	613.3	63.7	225.6	212.5	15,467	2,861	11,738	7,349	1,412	608.4	96.3	306.5	262.3
La. Gulf Coast	424	232.3	31.0	91.9	42.7	5,321	2,306	4,112	2,151	434	189.5	45.3	100.6	78.8
N. La. and Ark.	76	29.4	5.0	11.6	16.0	2,748	494	1,006	332	80	30.2	7.5	13.2	17.9
Rocky Mountain:														
New Mexico	11	6.1		2.0	2.6	76	25	95	30	14	7.1	0.5	2.0	4.0
Other Rocky Mtn.	174	77.1	2.0	32.1	35.4	2,668	341	1,586	721	158	70.7	3.8	27.9	34.1
California	838	339.7	10.3	126.1	301.1	16,440	808	12,210	36,927	887	373.3	16.1	133.9	322.3
August 6, 1949	5,188	2,557.0	237.6	894.1	1,031.4	108,444	24,885	72,222	67,281	5,621	2,532.2	296.1	1,038.4	1,247.5
July 30, 1949	5,187	2,579.7	211.1	899.0	1,029.2	109,964	24,547	70,878	67,166					
August 7, 1948	5,641	2,524.1	303.7	996.4	1,337.0	97,838	20,940	55,568	49,788					

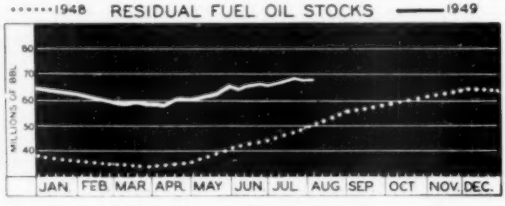
*At refineries including natural blended. †Finished and unfinished. ‡Revised in California.

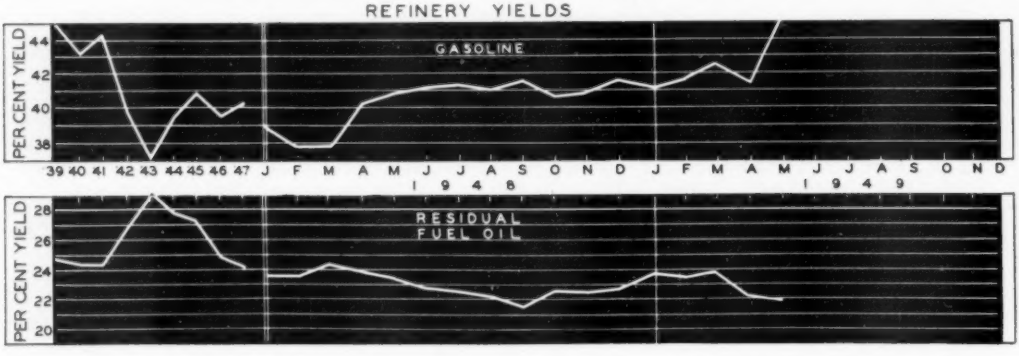











REFINERY YIELDS
GASOLINE
PER CENT YIELD
39 40 41 42 43 44 45 46 47 J F M A M J J A S O N D J F M A M J J A S O N D
1948
1949
RESIDUAL FUEL OIL
PER CENT YIELD

CRUDE PRICES GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.78			
19-19.9	1.85			
20-20.9	1.93	$2.25		$2.12
21-21.9	2.00	2.27		2.14
22-22.9	2.07	2.29		2.16
23-23.9	2.13	2.31		2.18
24-24.9	2.20	2.33	$2.56	2.20
25-25.9	2.26	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. Above changes do not include recent reductions of a few buyers applying principally to low-gravity grades.

FLAT CRUDE PRICES

Representative posted schedules per barrel

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.40
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above

ESSO STANDARD OIL CO. has announced an increase in its Gulf Coast cargo price for No. 2 distillate fuel oil to 6.625 cents per gallon effective August 15. This is 0.25 cents per gallon higher than the previous posting.

It was 4 weeks ago that Esso had to raise the price paid for residual at Gulf Coast ports to secure needed supplies and since that time residual markets in general have been better. The present increase for No. 2 fuel follows a trend toward a firmer distillate market in the Gulf Coast area that has been gaining for the past several weeks. Distillate stocks in the Gulf-East Coast districts have increased less than 800,000 bbl. in the last 3 weeks. Distillate inventories in all districts gained 3,600,000 bbl. in the same period but 1,300,000 bbl. of this gain was in California. For all districts east of California, the increase was at the rate of only 110,000 bbl. daily.

Considering the decreased rate of distillate production, there would be very few additions to distillate stocks at this time if resellers and consumers were making normal summer purchases. The firming of the heating oil market in the Gulf Coast area may well be the turning point in the general buyers strike that has existed for several months.

Gasoline demand continues at record levels but high yields at refineries have prevented the large inventory reductions that most refiners would like to see. Stocks dropped at the rate of about 1,000,000 bbl. per week for the past 3 weeks.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of August 15, 1949. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Tex. Gulf Coast
Regular gasoline, 73-75 octane	9⅜-10	11-11.5	9½-10
Premium gasoline, 78-80 octane	10⅜-11	12-12.5	10½-11
42-44 w.w. kerosine	7¾-8¼	7.75-8.4	7⅝-8
No. 2 straw fuel oil	6⅜-6¾	6.8-7.4	6⅜-6⅝
No. 6 residual	$0.85-0.90	$1.70	$1.35-$1.45

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.6	6	6.3

LUBRICATING OILS
South Texas

200 vis. No. 2-3 neutral	11
750 vis., No. 3-4 neutral	13-14
2,000 No. 5-6 neutral	15-16.5

LUBRICATING OILS
Mid-Continent

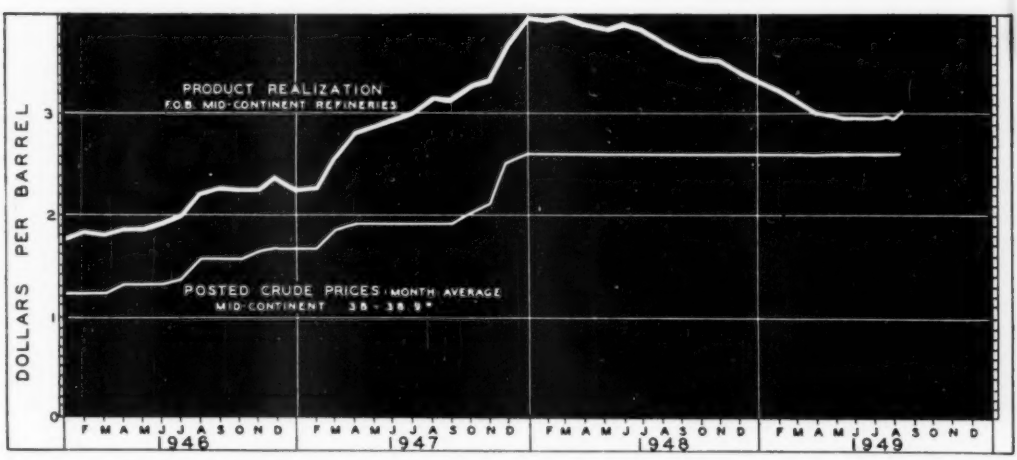
150-160 vis., D bright stock, 0-10 pp	19
200 vis., No. 3 neutral, 0-10 pp.	12-14

Western Pennsylvania

144-155 vis., 10 p.t. bright stock	19.5
180 vis., 0 p.t. neutral	20.5

CRUDE-SCALE WAX
Mid-Continent

132-134 A.M.P.	4.5



In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil

EQUIPMENT MEN . . . in the News

Colville Made Ad Manager Of B.-J. Pump Division

T. R. (Bob) Colville, was recently appointed advertising manager of the Pump Division of Byron Jackson Co. of Los Angeles. Colville worked in the advertising division of the chemical department of General Electric Co., until last fall. Prior to the war, he was assistant program director for an eastern radio station.

Bethlehem Appoints Medley As Special Representative

Bethlehem Supply Co. has announced the appointment of Charles E. Medley as a special representative. Medley will be located in Fort Worth and will direct his efforts to the sale of pumping units and other production equipment for the company. He attended University of Tennessee, where he majored in mechanical engineering. He entered the oil industry in 1926 and has 20 years' experience in the manufacture and sale of all types of oil-field equipment.

Hunt Tool Co. Names California Distributor

Regan Forge & Engineering Co., San Pedro, Calif., has been appointed distributor for the state of California, for Hunt swivel joints and steel drilling and cementing hoses manufactured by Hunt Tool Co., Houston.

S. V. Smith Joins Plastic Coating as Sales Engineer

Plastic Coating Corp., Houston, has announced that Sidney Val Smith, a graduate of Texas A. & M. College, has been added to its staff of sales engineers, in the Houston area.

Smith has served in sales-engineering capacity in recent years with Minnesota Mining & Manufacturing Co. and with Stewart & Stevenson in Houston offices. He has a B.S. degree in chemical engineering from Texas A. & M. In his new capacity, he will spend much of his time in the field surveying and supervising the application of plastic coating to oil-field equipment and marine vessels.

Joy Acquires Capital Stock Of Mines Equipment Co.

Joy Manufacturing Co., Pittsburgh, announces the acquisition of all the capital stock of Mines Equipment Co. Joy has been the exclusive sales agent in oil fields for the Mines line of derrick portable lighting cable, connectors, and breaker boxes which are sold under the trade name String-A-Lite.

Joy will continue to manufacture the complete line of Mines products which supplement the Joy line of oil-field drills, compressors, pneumatic tools, hoists, fans, and blowers.

Athey Produces Thousandth Forced Feed Loader

Plant officials of Athey Products Corp. celebrated recently, as the one-thousandth Athey forced-feed loader left the assembly line at Athey's Chicago plant. The forced-feed loader was developed before the war and the first machine rolled off the assembly line in 1942. Its production was suspended during the war but was again resumed in 1945.

Witnessing the completion of the one-thousandth Athey forced-feed loader are: B. F. Lease, Athey president; W. L. Kubik, vice president and plant manager; and A. T. Marchuk, assistant domestic sales manager

Eastman Oil Well Survey Opens Houston Office

Formal opening of the new Gulf Coast division office of Eastman Oil Well Survey Co., at Houston, was

H. J. EASTMAN

W. G. JAMES

celebrated July 30, with an open house for prominent oil-industry officials. The office building is a one-story structure with a 90-ft. frontage. The general office, reception lobby, four private offices, conference and drafting rooms, make up the plans of this building.

The welding, machine, and instrument shops are located in a 40-by-100-ft. prefabricated steel building, which also houses the warehouse section. A five-car garage for company cars is also located on the property.

The new Houston building is part of the company's recently completed $100,000 expansion program, which included a new district office at Ventura, Calif. The Houston office is home base for about 40 employes. In addition, branch offices at Brookhaven, Miss.; Houma, Lafayette, and New Orleans, La.; Victoria, Longview, and Alice, Tex., come under the jurisdiction of the Houston office.

On hand to greet the oil-industry guests at the company's celebration were William G. James, Gulf Coast division manager and a vice president of the company; W. H. Cook, division sales manager; and J. C. Staton, Gulf Coast field superintendent. Out-of-town Eastman officials at the party included H. John Eastman, president; Gordon Jackson, vice president and general manager; and Bud Hilker, director of public relations, all of Denver.

Mid-Continent Opens New Store at Plainville

Hundreds of guests attended an open house to celebrate the opening of Mid-Continent Supply Co.'s newest field store, located at Plainville, Kans. In announcing the opening of the new

store to serve the Kansas oil and gas industry, Ken W. Davis, president and general manager of the company, pointed out that the new service location is only a few miles from the exact center of the North American Continent.

C. C. Harris, formerly of the company's Great Bend store, is manager of the new Plainville store. Field salesman for the area served by the store is E. G. Mog, who also has been at Great Bend. Other Plainville personnel are L. O. Hedrick, Jr., formerly with Bethlehem Supply Co.; R. C. Van Leeuwen of Pittsburg, Kans.; and B. G. Remmert, from the Mid-Continent store at Great Bend.

Graver and Phoenix Make Devendorf Export Manager

E. E. DEVENDORF

E. N. Gosselin, president of Graver Tank & Manufacturing Co., East Chicago, Ind., and Phoenix Manufacturing Co., Joliet, Ill., has announced the appointment of E. E. Devendorf as export manager for both companies.

Devendorf was formerly New York manager of Western International Corp. He will handle the foreign phases of sales, advertising and promotion, and export for all divisions of the Graver and Phoenix companies.

A graduate chemical engineer of Stanford University, Devendorf has had 14 years' experience in the sales field and has recently returned from residence in South America. Graver has announced that with the appointment of Devendorf the company will extensively revise and expand its foreign sales agencies and representatives in South America, the Far East, the Near East, and Africa.

Moorlane Announces Personnel Changes

E. L. HAGAR

Following the midyear conference of branch managers and meeting of directors at Amarillo, Tex., William D. Moorer, president of Moorlane Co. of Tulsa, announced several organizational changes to become effective immediately. E. L. Hagar, vice president and manager of Moorlane's Kansas City branch, has been appointed executive vice president to assume jurisdiction of the Tulsa branch and sales coordination of the company.

Boyd A. Mead, formerly assistant to Hagar in Kansas City, has been appointed manager of the Kansas City branch. Dean Huffman, manager of the Denver branch, has been elected to the board of directors. Rex Bircket has been appointed manager of sales of the Tulsa home office district.

Hagar is well known throughout the Southwest, having been in the oil-equipment business in this territory since his graduation from Missouri University, school of engineering, in 1928.

Stockland Made FWD Director of Sales

M. O. Stockland, Jr., advertising and sales promotion manager for Four Wheel Drive Auto Co., has become director of sales, according to an announcement by Robert A. Olen, general manager of the company.

Robert L. Koehler, former director of sales, resigned to join in a partnership with Oscar E. Betow and John E. Battes in FWD Pacific Co., which distributes FWD trucks throughout the State of California. Battes leaves his post as FWD's western zone sales manager to join the partnership. The three partners have purchased FWD's Los Angeles branch.

Totco Announces Three Personnel Changes

RAY O'REAR

Ray O'Rear has been promoted to Gulf Coast division manager for Technical Oil Tool Corp., Ltd. He has been with the company a number of years, working in West Texas, Louisiana, and for the past year, in Houston. He will continue to headquarter in Houston.

Howard Reid, with many years of oil-field experience in Louisiana and

HOWARD REID

E. C. McCANN

Mississippi, has been appointed to work in the Houston area, thus increasing the strength of the Totco organization there.

Eugene C. McCann has recently been named field engineer for Totco in Lafayette, La., replacing John L. Brown. McCann has had several years of oil-field experience in the Louisiana territory.

Koneshot Charges Flown to Venezuela By Lane-Wells

Lane-Wells recently shipped 30,000 Koneshot charges by air, to Petro-Tech, Venezuelan affiliate of Lane-Wells. The shaped charges are for use in Koneshot guns operated in South American fields

Kirkpatrick to Represent Kieley & Mueller, Inc.

Appointment of John G. Kirkpatrick, Pittsburgh, as exclusive sales representative in the tristate area of Pennsylvania, New Jersey, and New York, has been announced by Kieley & Mueller, Inc., North Bergen, N. J., manufacturer of industrial control equipment.

Kirkpatrick assumes his new distributorship association with Kieley & Mueller with an industrial background that includes 4 years as sales engineer for the Bristol Co., 1 year with Fischer & Porter Co., 4 years in the instrument department of Kopper Co.'s Kobuta plant, and 3 years as instrument engineer in Kopper's main engineering department.

(Continued on page 207)

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED

All ads, 12 cents a word. Minimum charge, $3.00 per insertion.
Centered Line, any ad, $1.00.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

DISPLAYED, PER INCH

$12.00 per column inch per insertion. One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
COPY DEADLINE, 9:00 a.m. Monday prior to each week's issue.

THE OIL AND GAS JOURNAL
P. O. Box 1260, TULSA, OKLAHOMA

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE at Barnsdall, Oklahoma, warehouse: 1—5" x 16" Goulds Vertical Triplex Single Acting Pump, Fig. 1585, Ser. No. 37835, Gear Ratio 5.06:1, 36 RPM, 5,000 BPD, 800# WP. Price $750.00. Suitable for waterflood project. Cities Service Oil Co., Patridge, Bartlesville, Okla.

FOUR Lufkin single crank #31 C pumping units, complete with 30 H.P. General Electric motors. Full particulars, Wiegand Bros., Milam Bldg., San Antonio, Texas.

PACKAGED H_2S REMOVAL UNITS

We offer prompt shipment on skid-mounted hydrogen sulfide removal units for treating sour gas for pipe line or fuel gas purposes.

GRAFF ENGINEERING & EQ'PT. CO
3415 Westminster, Dallas 5, Texas

EQUIPMENT FOR SALE

FOR SALE OR TRADE: Jumbo C. Fort Worth Spudder, trailer mounted, shear poles, E. 60 Allis-Chalmers power. With or without complete tool line, dog house, etc. Would trade for good string range #1 internal flush 2⅞ drill pipe, core barrel, etc. Box 378, Cherryvale, Kansas.

FOR SALE: McKissick Tubing and Floor Blocks. Save 50%. Melton Supply Co., Seminole, Okla.

FOR SALE: Two Fairbanks-Morse Diesel Engines, 150 H.P. Twin Cylinder, Horizontal Type. Completely overhauled. $1500.00 each. Melton Supply Co., Seminole, Okla.

WICHITA 50 Spudder, now working, fully equipped to go 2500 foot depth. Pipe from 15 to 5 inch, Hercules engine, underreamers, tools, light plant, packers, tubing, etc. Cash price fifteen thousand. F. E. Hunt, Adair, Iowa.

FOR SALE: Cardwell Rotary Rig, complete with Mast. Suitable for 3,500 ft. drilling. Bargain. Terms. Melton Supply Co., Seminole, Okla.

FOR SALE in our Pampa gasoline plant: Two 163 horsepower 207# working pressure Wm. Bros water tube boilers complete with boiler house, pumps, and all auxiliary equipment. Now available. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

WE CARRY THE LARGEST STOCK OF

New Parts for Civilian & Army Trucks

Winches, Steel Snatch Blocks, Pulleys, Heavy Duty Tools, and Equipment

Phone! Wire! or Write!

RING BROS.

Route 1 Elizabeth, N. J.
Phone: ELizabeth 5-7800

EQUIPMENT FOR SALE

FOR SALE: Complete outfit for water well drilling, in good condition, including: Rotary Mayhew 1000′ drill, tank truck, supply truck, and house trailer. Also available for sale supply of pipe, pumps, etc. For details write to Buell-Edlund Drilling Co., Box 154, Miles City, Montana.

HEAVY DUTY geophysical drill, 18′ kelly, chain pull down, hydraulic lift mast, 4½ x 6 G. D. pump, Twin Disc clutches. Mounted on 1943 Ford Truck. Waters Drilling Service, 69 Beacon Place, Pasadena 8, Calif.

6000-FT. ROTARY RIG, diesel powered, complete with 4½" drill pipe, ready to drill. Near Alice, Texas. Full particulars and price, Wiegand Bros., Milam Bldg., San Antonio, Texas.

NATIONAL "50" Compound Double Drum Rig 126′ Cantilever Ideco Mast, 10′ substructure, 6,000′ 4½" drill pipe, this rig complete and in excellent condition. P.O. Box 205 Sta. B, Bakersfield, California.

NO. 3A6 National drilling machine with complete string of tools from 18" down. All in excellent condition. Located near Mannford, Oklahoma. Gled Oil Co., 110 Midco Building, Tulsa, Okla., Phone 5-2251.

FOR SALE: Sullivan 300A drilling rig complete ready to move to job, terms to reliable party. Phone 6508 or 3996, P.O. Box 501, Abilene, Texas.

Several Army Surplus 4½" x 6" Gaso Duplex 1860 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

NEW FRACTIONATING TOWER REFLUX DRUM

One (1) New fractionating tower, 5′-0" I.D. X 89′-6" over-all height X 1½" plate. Thirty-four (34) bubble trays, ten (10) 18"-300# manways. Stress relieved and built in accordance with API-ASME Code for 350 PSI working pressure.

One (1) new horizontal reflux drum, 5′-6" I.D. x 18′-6" over-all length x 1-⅛" plate. Stress relieved and built in accordance with API-ASME Code for 350 PSI working pressure.

ROCK ISLAND OIL & REFINING CO., INC.
335 West Lewis St. Wichita, Kansas
Phone 7-3325

WE OFFER, SUBJECT TO PRIOR SALE

TUBING

2000 ft. 2" upset 4.70# 8-rd. thd., smls., used	$ .40 ft.
8000 ft. 3" upset 9.30# 10-V thd., smls., used	$ .55 ft.

CASING

5000 ft. 4½" OD 50# seamless, used	$ .60 ft.
4000 ft. 4½" OD 16.60# 8-rd. thd., smls., used	$ .75 ft.
3000 ft. 5½" OD 17#, seamless, used	$ .80 ft.
6000 ft. 7" OD 24#, seamless, used	$1.25 ft.
210 ft. 10¾" OD, 32.75#, seamless, NEW	$2.67 ft.

LINE PIPE

15000 ft. 2", 3.75# API, T&C, used	$ .22 ft.
2000 ft. 3", 7.70# API, T&C, used	$ .40 ft.
2000 ft. 4", 11# API, T&C, used	$ .50 ft.

MACHINERY AND BUILDINGS

1—40 HP OCS Pumping Unit w. DHK Waukesha Engine and 12′x12′x8′ Butler and Steel Engine House	$1750.00
4—40 HP Cooper-Bessemer Type GA Horizontal (9¾" x 16") Diesel Engines, complete w. Starting Units, Clutches and Belt Idlers	$250.00 each
1—40 HP Type GSD Cooper-Bessemer, 2 cyl., 2-cycle vertical Gas Engine, w. Clutch, Engine Cooler and Starting Unit	$650.00
1—4" x 6" Oilwell Power Pump (completely overhauled)	$450.00
2—16′ x 32′ x 8′ Bradcn, galvanized, all steel buildings	$550.00 each

All the above F.O.B. Chase, Kansas.

WEST SUPPLY COMPANY

Phone 196 **Chase, Kansas**

REFINERY AND GASOLINE PLANT EQUIPMENT

(6) 18,000 gallon casing head storage tanks, 10 ft. x 30 ft. x ½ in., dished heads. $900 ea.

(5) 8,000 gallon casing head storage tanks, 7 ft. x 3 ft. x 7/16 in., dished heads. $600 ea.

(1) Still, 6 ft. x 35 ft. x ½ in., dished heads, 200 lb. W.P. with 200 sq. ft. 2 in. pipe coil. $2500.

(5) Vessels, 3 ft. 6 in. x 10 ft. x ⅜ in., dished heads. $190 ea.

(1) Vacuum tower, 5 ft. x 44 ft. 7 in. x ⅜ in., with 13 trays and pipe coil in bottom. $2500.

(1) Truscon Steel Building, 60 ft. x 186 ft., heavy fabricated structural steel and steel panel construction. With steel sash and door. $5580.

Above listings subject to prior sale.

Write—Wire—Phone

BROWN-STRAUSS
Corporation
P. O. Box 78 Phone LD 169
Kansas City, Missouri

FOR SALE: 10,000 ft. 20" OD x ¼" Wall New Electric Weld Steel Pipe, Double Random Lengths; 50,000 ft. 18" OD x ¼" Wall Used Steel Pipe, Single Random Lengths. Utility & Industrial Supply Company, 921 Michigan Ave., E., Jackson, Michigan.

FOR SALE: 2, complete Wilson Mogul skidtype spudders, with double pole mast costing $3200, powered by 165 hp. GAKU Waukesha motors, good condition, F.O.B. Cars, price $4,000 each, Model 121, Serial No. 3760. One Wilson Mogul Spudder, with mast, less engine, $2,250. 1—145 H.P. Young Drilling engine, complete, A1 condition guaranteed, gas-gasoline, $2,250.00. 1—Riise 110 H.P. Drilling engine, natural gas, $2,000. 1—Clark 2 cy. 70 H.P. with 6 cy. starting engine, $350. One Caterpillar 60—gasoline-gas engine, with jack shaft and clutch, flat belt drive, $650.00. 25 Pumping engines, South Penn 20 H.P. $125; 20 H.P. Reids and 22½ H.P. Bessemers $150 to $200 each. 100 Pumping and drilling belts for sale. McGinnis, Tri State Oil and Gas Co., Box 827, Parkersburg, W. Va.

FOR SALE: 1 UMT Allis-Chalmers tractor on new rubber with Cooper Winch. Price $1,000.00. 1 Skid type Cooper Unit—Price $2,000.00. 1 Skid type Cardwell H Spudder with MZR Waukesha Motor. New string of five inch tools with quick change-over sockets. New 4,000 foot line. Price $5,000.00. Also have Cardwell Model QS Unit with telescope pole. Mounted on truck. Might sell. These Units are in good condition and suitable for wells up to 3,500 ft. Fred Frogge, Leon, Kansas. Phone No's 4316 or 2952.

PIPE AND CASING BARGAINS

All pipe used lap weld. Tubing not cleaned of paraffin.

All A1 tubing and casing, good collars and threads.

TUBING: 10,000 ft. 2⅜ upset tubing, 4.50 wt. 11½VT. 19c ft.

14,000 ft. 2⅜ regular tubing, 4.50 wt. 11½VT. 20c ft.

USED LAP WELD CASING, A1, Ready to Run

3200 ft. 5½ O.D. 13 lb. 11½ V.T., 60c ft.
3100 ft. 7 in. O.D. 17 lb., 10 V.T., 60c ft.
1000 ft. 8⅝ O.D. 24 lb. 8 V.T. $1.20 ft.
1000 ft. 10 in. 32.75 wt. 8 V.T. $1.75 ft.
3200 ft. 7 in. O.D. 20 lb. 10 V.T. 80c ft.
(F.O.B. Cars Northern West Va.)

FINEST USED LAP WELD IN WEST VA.

21,000 ft. 5½ in. O.D. A1. 13 lb. casing, 62c ft.
18,000 ft. 7 in. O.D. A1. 20 lb. casing, 82c ft.
2,860 ft. 7 in. O.D. No. 2 grade, 20 lb., 72c ft.
(F.O.B. Cars near Charleston, W. Va.)

BARGAINS IN LINE PIPE

75,000 ft. 2⅜ 3.75 wt. used line pipe, threaded and shopped, ready to run, F.O.B. cars, Friendship, N. Y., 15c ft.
60,000 ft. 2⅜, 3.75 wt. some used 4 lb. tubing not shopped. 1/3 A1 pipe, 1/3 second grade, 1/3 3rd grade pipe, 7½c ft. Ship from Oil City, Pa.

DRIVE PIPE: 2,500 ft.—8⅝, 29 and 32 lb., reconditioned drive pipe, heavy collars, good tapered threads, ready to run, $1.58 ft. (from Oil City, Pa.)

Line Pipe: 7,000 ft., A1, used once, 1 in. heavy seamless tubing, long collars, 14c ft.

14,000 ft. 2⅜, 3.75 wt., used, reconditioned line pipe, ready to run, 14c ft.

CASING: 3,000 ft. 6¼, 13 lb. lap weld, 11½ V.T. used casing, ready to run, 65c ft. 2,000 ft. 4⅞ casing, 65c ft.

SEND US YOUR PIPE ORDERS AND INQUIRIES

12,000 ft. 5 in. O.D. used wrought iron line pipe, T&C 8 thread, 45c ft. Will plain end and bevel at cost of extra work.

4,500 ft. 4 in. O.D. T and C. good straight pipe, ½ of it shopped, 42c ft. (Ship from Oil City, Pa.).

RIGS—ENGINES—BELTS—TANKS
CABLE TOOLS

Spudders, Drilling Engines, Regulators, Sucker Rods, Bits, Bailers, Wire Lines.

Phone or call on H. P. McGinnis.

TRI STATE OIL AND GAS CO.
Box 827, Phone 7-5121 or 7-5688
for Appointment.
Parkersburg, West Va.

EQUIPMENT FOR SALE

EQUIPMENT FOR SALE

FOR SALE

Shot Hole Rig **Water Well Rig** **Core Rig**

National Type 1-D Drill; Hollow Kelly; Chain Pull Down; Mast 25' 6"; With Gardner-Denver Model FXF Pump, Size 4½ x 5; Above mounted on 1946 Dodge WHA 46. 16,000# GVW, 2 Ton, 148" WB; Sale Price **$3,500.00**

National Type 1-D Drill; Hollow Kelly; Chain Pull Down; Mast 25' 6"; With Gardner-Denver Model FXF Pump, Size 4½ x 5; Above Mounted on 1942 Chevrolet Truck 1½ Ton, 160" WB; Sale Price **$2,500.00**

THE ATLANTIC REFINING COMPANY
P. O. Box 2819
Dallas 1, Texas

FOR SALE
OFFSHORE SEISMOGRAPH FLEET

Bids are invited for the following equipment which includes all boats, Shoran surveying equipment, and radio equipment required for offshore seismic exploration. At present based at Freeport, Texas, and can be inspected by appointment.

BOATS

2—62'-4" Diesel twin screw steel recording boats built to order by Higgins.
2—45'-9½" Diesel twin screw "Eureka" boats for Shoran base stations.
1—37' gasoline single screw wooden "Eureka" boat.
1—45' steel utility barge.
1—16' Higgins skiff with outboard motor.

SHORAN EQUIPMENT

Complete Shoran surveying equipment for three mobile stations and three base stations.

RADIO EQUIPMENT

7—Kaar series 46Y radio transmitters (50 watt).
7—Kaar series 25EY radio receivers.
6—Premax antennas.
4—Kaar 642A power supply (110 v AC)
5—Kaar D24Y direction finder receivers.
1—Set Halliburton wire line surveying equipment.
Miscellaneous radio and Shoran test equipment.

ALSO

1—110' converted Sub-chaser Diesel twin screw wooden recording bbat complete with necessary radio equipment at present based at Morgan City, Louisiana.

Write Box D-143, THE OIL AND GAS JOURNAL, Tulsa, Okla.

FOR SALE

12—230 H.P. Type 10 Bessemer New 17" Power Cylinders complete ready to run with 16" to 18" Compressors. 1—230 H.P. Clark Horizontal with Compressors. Located Salem, Illinois.

ENGLE PETROLEUM, Incorporated
Box 655, Evansville, Indiana

NEW 6⅝" O.D. API LINE PIPE

Seventy-three (73) Miles New 6⅝" O.D 13# API Electric Weld Line Pipe, Plain End, Beveled for Welding, Regular Mill Coating, double random length Van Dyke Protectors Applied. Rock Island Oil & Refining Co., Inc., 335 West Lewis Street, Wichita, Kans. Telephone 7-3325.

For Sale

NEW 2⅞" DRILL PIPE TUBING

20,000' 2⅞" O.D. x 2.151" I.D. x 20' Lg., Rd. C.D. Seamless Mechanical Tubing. AISI 4140 normalized commercial quality electric furnace. Will sell as is; by upsetting, either external or internal; will make-up with tool joints.

MILL PRICE, subject to prior sale.

ENGINEERING LABORATORIES, INC., TULSA

P. O. Box 349 **Phone 2-8291**

COMPLETE used generating plant GM twin diesel with 100 KW generator 3 phase 440 with switch board and voltage regulator. For quick sale. Damon L. Krumsick, Phone Mutual 247, Paola, Kansas.

FOR SALE: New and used oil field casing. Large stock both new and used ready for immediate shipment. Seamless and Lap-weld sizes 4⅞-13⅜. Assorted sizes in cars if desired. Can also supply tubing, line pipe, sucker rods, wire lines, gas engines, derricks. In short, it will pay you to give us a call for anything needed in the oil field. We ship open account to well rated firms and individuals. A. R. Kelly, Parkersburg, West Virginia. Phone 7-6292.

CORPORATIONS ATTENTION: This complete aviation dept. must go. Airplane, spare parts, and Pilot. D-17-S Beechcraft, P & W 450 HP. Total time frame 750 hrs. Engine and prop 180 since zero major. Chrome spinner. Beautiful hand rubbed finish, yellow with blue trim. One of the best looking stagger wings in the country. New brakes, battery, and tires. Flares. Flashing lights. 123 gallons gas. Good upholstery trimmed in brown. Complete instruments. Fluorescent lights. Radio, ARC tunable VHF receiver and 5 channel transmitter. Crosley 6 channel localizer and indicator. Bendix 2 channel 3105 transmitter. Bendix MN-28C rotable loop, 150-1500. Marked beacon. Cabin speaker. Spare parts include, BT engine, accessories, prop and spinner. Pickled, 330 hrs. major. Tires and tubes. Butyrate dope. Complete set brakes and seals. 4 chest chutes. Many others. Company Pilot: Age 25, married. 3000 accident free hours, day, night, and instrument. Cubs to B-29. Thoroughly experienced mountains and all phases of cross country. Land dept. when not flying. Best references. For an A-1 company owned airplane, and or pilot, call, wire, write, John A. Lyon, Malco Refineries, Inc., Roswell, New Mexico.

EQUIPMENT FOR SALE

BULLDOZERS: 1 D6 Caterpillar new $9,000, 1 D6 Caterpillar less than year old $7,000, 1 TD14 International less than year old $6,500, 1 TD14 International recently overhauled $3,750, 1 TD9 International recently overhauled $2,750. Motor graders: #8 American recently overhauled $2,500, #51 Adams recently overhauled $3,000. 1 60 C.F.M. Chicago Pneumatic compressor with hammer, hose and bits, used very little, $1,000. Western Construction Co., Phone 3241 or 5571, San Angelo, Texas.

GEOPHYSICAL RIGS for sale, or will furnish rigs and help finance experienced driller starting in contracting business. Write Box D-123, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE: Two like new 74,000 bbl. cap. tanks. Low price, at Morgantown, W. Va. 2 new 10,000 bbl. bolted at N.Y. Darien Corp., 60 E. 42nd St., N. Y., N. Y.

FOR SALE: Oil well casing and line pipe. Direct price and mill shipment. Plagenz, Park Building, Cleveland, Ohio.

TANK HEATERS
Thermetal Co., Sales Engineers
4329 Gillham, K. C. (4), Mo.

EQUIPMENT WANTED

WANTED: One 250-hp., 3-stage 500-psia. power and compressor unit. One 300-hp., 4-stage, 1,000-psia. power and compressor unit. Replying, give make, location, condition, power fuel, price. Box D-150, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Two Sweetland Presses, Sizes 3 to 7 inclusive. Box D-1440, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

WANTED: Associate Professor of Petroleum Engineering — part-time research. Graduate work and industrial experience required. Reply Box D-145, The Oil and Gas Journal, Tulsa, Oklahoma.

NEW foreign and domestic Oil Employment Directory. Over 500 listings in drilling, production, refining, natural gasoline, pipelines, geological, exploration, supplies, manufacturers, services; and trucking, refinery and pipeline contractors, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 7603, Tulsa, Okla. (Our 29th Year).

WANTED: Oil treating engineer, headquarters Oklahoma City, to establish company-wide treating methods, 12 states. Includes instruction of company personnel. Must have at least three years oil production treating experience. State full particulars. Address Personnel Department, Sohio Petroleum Company, First National Building, Oklahoma City, Oklahoma.

WANTED: 2 young men, 24 to 27 years of age

1 Graduate Geologist.
1 Graduate Petroleum Engineer.

Steady work in Michigan with small Independent producer. Write: Norman L. Stevens, Breedsville Road, Bangor, Michigan.

CONSTRUCTION MEN
Welders, Ditch and other inspectors. Salary and flat expense allowance. Box D-137, The Oil and Gas Journal, Tulsa, Okla.

GEOPHYSICIST
CARACAS, VENEZUELA

Senior man familiar with interpretation of seismic and gravity data, capable of independent review work. Minimum 5 years experience. Liberal living allowances and end of year bonus provided. Write complete details of experience and background, stating salary requirements to Foreign Personnel, The Atlantic Refining Company, Box 2819, Dallas, Texas.

WANTED
Midwestern manufacturer seeks man with engineering background experienced in the sale of equipment to the oil industry. Familiarity with internal combustion engines desirable. State qualifications, age, and compensation required in first letter. Write
Box D-148, The Oil and Gas Journal, Tulsa, Oklahoma

HELP WANTED

GAS SCOUT to work from main office of large independent company. Chemical or petroleum engineering education with minimum of five years field experience required. Must be thoroughly familiar with gas measurement, gas testing, and estimation of reserves. Give full details of education and experience in first letter. All replies confidential. Box D-141, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL Engineer as assistant superintendent in combination natural gasoline and LPG plant. Opportunities for advancement. Give experience. Box D-1430, The Oil and Gas Journal, Tulsa, Oklahoma.

ILLINOIS independent has position open for man under 40 experienced in accounting in oil field operations including production and drilling. State qualifications, experience, and salary expected. Locate Robinson, Illinois. Box D-127, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST with current or recent active experience in West Texas wanted for geological department of independent oil company located in Midland, Texas. Excellent opportunity for man under forty years age who can organize, direct and administer all phases of an aggressive geological program leading to the development of production. Personal interview may be arranged based on merit indicated by a written outline of past experience and training. All replies will be handled in confidence, and should include date of availability and starting salary desired. Recent photo or snapshot would be helpful. Address Box D-139, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: A well established, major geophysical company wishes to employ a highly qualified party chief. The individual must have a college degree, a minimum of 2 years actual experience as a party chief, and be willing to move with the seismic party. This is a solicitation for a man of outstanding caliber who has the capacity to advance in a company with a high regard for its present good reputation. Give age, education, experience, salary expected, references, and all other appropriate details in first reply. Our employees know of this ad. All replies will be treated confidentially. Reply to Box D-144, The Oil and Gas Journal, Tulsa, Oklahoma.

HOUSTON DISTRICT Sales Engineer: Engineer familiar with pumps, compressors, exchangers, etc., having sold this type of equipment in Texas for at least the last 3 years to refinery, gasoline plant, and pipe-line companies. Replies confidential. Box D-117, The Oil and Gas Journal, Tulsa, Oklahoma.

RESIDENT ENGINEER, refinery or gasoline plant construction. Immediate employment. Box D-133, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

ENGINEER-SUPERINTENDENT — M.S. in Ch.E., age 35, registered Texas engineer, thorough knowledge refining, nine years varied experience engineering and plant supervision, most recently manager small refinery, available at once due to plant shut down. Write WRS, Box 112, Winnsboro, Texas.

ENGINEER with fifteen consecutive years experience directing engineering, construction, and operation of refining and gas processing plants and facilities, and engaged in consulting work for past several years, desires permanent connection requiring top flight engineering and management ability. Box D-125, The Oil and Gas Journal, Tulsa, Okla.

EXPERIENCED GRADUATE MECHANICAL ENGINEER wants connection which may require any of the following qualifications: Oil field equipment sales—Experience in leasing, drilling and producing oil wells—10 years field and executive experience with nationally known service companies. Box D-142, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM engineer, 33, married, B.S., 7 yrs. experience. Qualified to supervise drilling, production, or reservoir work. Box D-149, The Oil and Gas Journal, Tulsa, Oklahoma.

LADY with extensive oil and legal experience, secretarial and office management, desires work with independent oil company. P.O. Box 2273, Casper, Wyoming.

SITUATIONS WANTED

PETROLEUM engineer, 27, University of Oklahoma grad, 3 years experience in refinery piping engineering. Seeks affiliation with Southwest producing company. Box D, The Oil and Gas Journal, 415 Lexington Avenue, New York, 17, N. Y.

PETROLEUM Engineer, age 31, thoroughly experienced in production, well completions, workovers, and reservoir engineering, desires position with aggressive independent. Box D-146, The Oil and Gas Journal, Tulsa, Oklahoma.

PRACTICAL man, supervisory position, twenty-five years general refinery and allied chemical experience. 16 years stillman on various topping and cracking plant operations. Capable of directing plant operation and maintenance. Age 45 years. Desire connection of permanent nature. Box D-152, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLER, single, 24, 4½ years experience, mud specialist, desires South American employment as driller or warehouseman. Box D-151, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer, B.S., age 38, four years production and reservoir experience major company; desires permanent location north or east. Box D-147, The Oil and Gas Journal, Tulsa, Oklahoma.

GASOLINE Plant Chemist, 15 years refinery and gasoline plant experience. Either domestic or foreign. Speaks Spanish. Available October 1st. Box D-1450, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER, graduate petroleum engineer with eight years sales experience to industrial plants and through dealers. Five years with national valve manufacturer, two as assistant manager. Desire permanent connection with good opportunity. Russell, 5418 Goodwin, Dallas, Texas.

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GEOLOGIST—15 years major company experience desires position with independent concern. Box D-153, The Oil and Gas Journal, Tulsa, Oklahoma.

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PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

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EQUIPMENT MEN

(Continued from page 202)

Sweet Names Warren As Service Manager

FRED WARREN

C. H. Sweet, president of Sweet Oil Well Equipment, Hobbs, N. M., has announced the appointment of Fred Warren as service manager.

Warren has served with a number of drilling firms in West Texas and Louisiana since 1934. As drilling foreman for Two States Drilling Co., in 1942 he ran the first formation packer built by Sweet for selective-zone acidizing.

From 1944 until he joined Sweet, he served as assistant drilling superintendent for Fullerton Oil Co., in Andrews, Tex.

Dowell Promotes Three To Sales Engineers

Three Dowell Incorporated men have been promoted to sales engineers, one to development engineer, and a new station has been established, according to an announcement by R. D. Shaw, general sales manager.

Promoted to sales engineers are Marvin E. Johnston, Larkin L. Blake, and Clarence R. Olson, Jr. Johnston, now stationed at Pratt, Kans., came with Dowell in 1943. Blake came to Dowell in 1944 with broad experience in refining as a superintendent of production. He is now stationed at Lafayette, La. Olson, now at El Reno, Okla., formerly was with Olson Drilling Co., and came to Dowell in 1947.

Dowell has also established a new station at Sullivan, Ind. B. E. McCann, from Flora, Ill., is in charge. He will be assisted by J. R. Jay, of Grayville, Ill.

Herbert B. Walther, Jr., sales engineer for Dowell in Richmond, Va., has been promoted to development engineer and the Richmond sales outpost enlarged to a station. Walther, who has been with Dowell since 1944, previously served as an engineer with Brooklyn Union Gas Co. He will be assisted by Ed Seel and Harry Porter.

Legeron Goes to Canada For Schlumberger

Schlumberger Well Surveying Corp., Houston, has announced the transfer of H. R. Legeron from the company's headquarters to its Canada division where he will serve as manager.

C. W. Bailey, former Schlumberger manager in Canada, has been moved back to the company's operations in the United States. B. L. Delleney will continue as assistant manager in the Canada area.

Schlumberger has also announced the appointment of R. D. Ford as manager of the Mid-Continent area with headquarters in Tulsa.

Gibbons Joins Western Supply Exchanger Division

F. M. GIBBONS

J. E. Hughes, manager of the heat - exchanger division of Western Supply Co., Tulsa, has announced the appointment of Frank M. Gibbons as exchanger division representative in the Gulf Coast area, with offices in Houston. Gibbons comes to Western from Bechtel Corp., where he had served in several engineering capacities for the past 8 years. Prior to his association with Bechtel, he was in heat-transfer work with American Locomotive Co. He is a graduate mechanical engineer of Brooklyn Polytechnic Institute, and studied petroleum engineering at University of Southern California.

Simultaneously, Western announced the opening of expanded offices in Houston. Paul R. King, who opened Western's first office in Houston in 1948, will continue to represent the company in the Gulf Coast area in the sale of pipe, valves, and fittings.

Herbert Marshall Goes To Midland for Western

H. MARSHALL

Herbert Marshall, vice president and general counsel of Western Co., oil - well acidizing and perforating firm, has moved his office from Dallas to the company's headquarters in Midland. Marshall has served as legal representative for Western since it was organized by H. E. Chiles, Jr., and Robert L. Wood in 1939. Chiles is now president and owner of the company. Wood, who also lives in Midland and is president of Frontier Chemical Co., disposed of his interest in the company 3 years ago when Frontier was established. When Western was incorporated recently, Marshall was appointed vice president and general counsel which necessitated his move to Midland.

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CALENDAR

August

United Nations Scientific Conference on the Conservation and Utilization of Resources, U. N. Interim Headquarters, Lake Success, N. Y. August 17-September 6.

Western Petroleum Refiners Association, regional technical meeting, symposium on diesel fuels, Leonard Refineries, Inc., plant, Alma, Mich., August 19.

September

Interstate Oil Compact Commission, summer quarterly meeting, Stanley Hotel, Estes Park, Colo., September 1-3.

American Institute of Chemical Engineers, Mt. Royal Hotel, Montreal, September 6-9.

Pacific Coast Gas Association, fifty-sixth annual convention, Santa Barbara, Calif., September 7-9.

Instrument Society of America, annual meeting and exhibit, Municipal Auditorium, St. Louis, September 12-16.

National Petroleum Association, Hotel Traymore, Atlantic City, N. J., September 14-16.

American Chemical Society, 116th national meeting, Atlantic City, N. J., September 18-23.

American Association of Oilwell Drilling Contractors, ninth annual meeting, Baker Hotel, Dallas, September 19-21.

National Butane-Propane Association, Jefferson Hotel, St. Louis, September 19-21.

Mid-Continent Oil and Gas Association twenty-seventh annual convention, Louisiana-Arkansas division Roosevelt Hotel, New Orleans, September 22-23.

American Institute of Mining and Metallurgical Engineers, regional meeting, Neil House, Columbus, Ohio, September 25-28.

American Society of Mechanical Engineers, fall meeting, Erie, Pa., September 28-30.

October

Independent Petroleum Association of America, Texas Hotel, Fort Worth, October 2-4.

American Society of Mechanical Engineers, petroleum division, 1949 Petroleum Mechanical Engineering Conference, Biltmore Hotel, Oklahoma City, October 2-5.

National Association of Corrosion Engineers, South-Central Regional Division, annual meeting, Adolphus Hotel, Dallas, October 3-4.

National Lubrication Grease Institute, Hotel Roosevelt, New Orleans, La., October 3-5.

American Institute of Mining & Metallurgical Engineers, Petroleum Branch, fall meeting, Plaza Hotel, San Antonio, October 5-7.

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